

IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT



**May 5 2016
Exceptional Event Documentation
For the Imperial County PM₁₀ Nonattainment Area**

FINAL REPORT
December 11, 2018

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ACRONYM DESCRIPTIONS

AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
PST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration

nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM ₁₀	Particulate Matter less than 10 microns
PM _{2.5}	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On May 5, 2016, State and Local Ambient Air Monitoring Stations (SLAMS), located in Brawley (AQS Site Code 060250007), Niland (AQS Site Code 060254004), and Westmorland (AQS Site Code 060254003), California measured exceedances of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM₁₀) concentrations of 163 µg/m³, 172 µg/m³, and 227 µg/m³ (**Table 1-1**). PM₁₀ 24-hr measurements above 150 µg/m³ are exceedances of the NAAQS. The SLAMS in Brawley, Niland, and Westmorland were the only stations in Imperial County to measure exceedances of the PM₁₀ NAAQS on May 5, 2016.

TABLE 1-1
CONCENTRATIONS OF PM₁₀ ON *MAY 5, 2016

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m ³	PM ₁₀ NAAQS µg/m ³
5/5/2016	Brawley	06-025-0007	3	24	163	150
5/5/2016	Niland	06-025-4004	3	24	172	150
5/5/2016	Westmorland	06-025-4003	3	24	227	150
5/5/2016	Calexico	06-025-0005	3	24	125	150
5/5/2016	El Centro	06-025-1003	4	24	85	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted¹

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM₁₀ data from Federal Reference Method (FRM) Size Selective Instruments (SSI) since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM₁₀ data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM₁₀ data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM₁₀ data since 2013 is regulatory. On May 5, 2016, the Brawley, Niland, and Westmorland monitors were impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds caused by a large Pacific storm system and associated cold front that moved through California and into Imperial County.

This report demonstrates that a naturally occurring event caused an exceedance observed on May 5, 2016, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship

¹ According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2015 Pacific Daylight Time (PDT) is March 13 to November 6. <https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl>

between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM₁₀ 24-hour NAAQS exceedances of 163 µg/m³, 172 µg/m³, and 227 µg/m³ (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)².

I.1 Demonstration Contents

Section II - Describes the May 5, 2016 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the wind driven emissions from the event led to the exceedance at the Brawley and Westmorland monitors.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley, Niland, and Westmorland stations this section discusses and establishes how the May 5, 2016 event affected air quality such that a clear causal relationship is demonstrated between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM₁₀ data measured in both local conditions and standard conditions. Measured PM₁₀ continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the May 5, 2016 event and its resulting emissions defining the event as a “natural event”.³

Section IV - Provides evidence that the event of May 5, 2016 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

² "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

³ Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD provided the National Weather Service (NWS) weather discussion via the ICAPCD's webpage for May 5, 2016 as early as May 4, 2016. The ICAPCD notification included forecast information for Wednesday, May 4, 2016 indicating that windy conditions were expected for May 5, 2016 along with patchy blowing dust. On May 5, 2016 the ICAPCD advised individuals that a large Pacific low pressure system would be moving into the desert Southwest through the weekend. The Pacific weather system was expected to bring cool and cloudy weather with potential showers and brisk winds during the afternoon and evening hours. Similarly, both the San Diego and Phoenix NWS offices issued weather stories and Urgent Weather messages indicating the potential for strong winds with gusts above 35mph and accompanying blowing dust. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day advisory for Imperial County on May 5, 2016. **Appendix A** contains copies of notices related to May 5, 2016.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. The notification is accomplished by flagging the data in AQS and providing an initial event description.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM₁₀ concentrations from the Brawley, Niland, and Westmorland monitors on April 17, 2017. The INPEE, for the May 5, 2016 event, was formally submitted by the CARB to USEPA Region 9 on April 24, 2017. Subsequently there after a second revised request was sent to CARB requesting preliminary flags on additional days during 2016. **Table 1-1** above provides the PM₁₀ measured concentrations for all monitors in Imperial County for May 5, 2016. A brief description of the meteorological conditions was provided to CARB, which provided preliminary information that indicated a potential natural event had occurred on May 5, 2016.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on January 10, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of $163 \mu\text{g}/\text{m}^3$, $172 \mu\text{g}/\text{m}^3$ and $227 \mu\text{g}/\text{m}^3$ which occurred on May 5, 2016 in Brawley, Niland and Westmorland. The final closing date for comments was February 12, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County are set to discuss each flagged exceedance for 2016.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the May 5, 2016 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR §50.14(c)(3)(iv))

- A This demonstration provides evidence that the event, as it occurred on May 5, 2016, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.
 - a The event created the meteorological conditions that entrained emissions and caused the exceedance.
 - b The event clearly “affects air quality” such that there is the existence of a clear causal relationship between the event and the exceedance.
 - c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
 - d The event “is not reasonably controllable and not reasonably preventable.”
 - e The event is “caused by human activity that is unlikely to recur at a particular location or [is] a natural event.”
 - f The event is a “natural event” where human activity played little or no direct causal role.

- B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley, Niland, and Westmorland.
- C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II May 5, 2016 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the May 5, 2016 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (Figure 2-1). The Colorado Desert not only includes Imperial County but a portion of San Diego County.

**FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY**



Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2**). In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA



Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6**). Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back country with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that are visible while driving on Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK



Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS



Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Geronio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT



Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

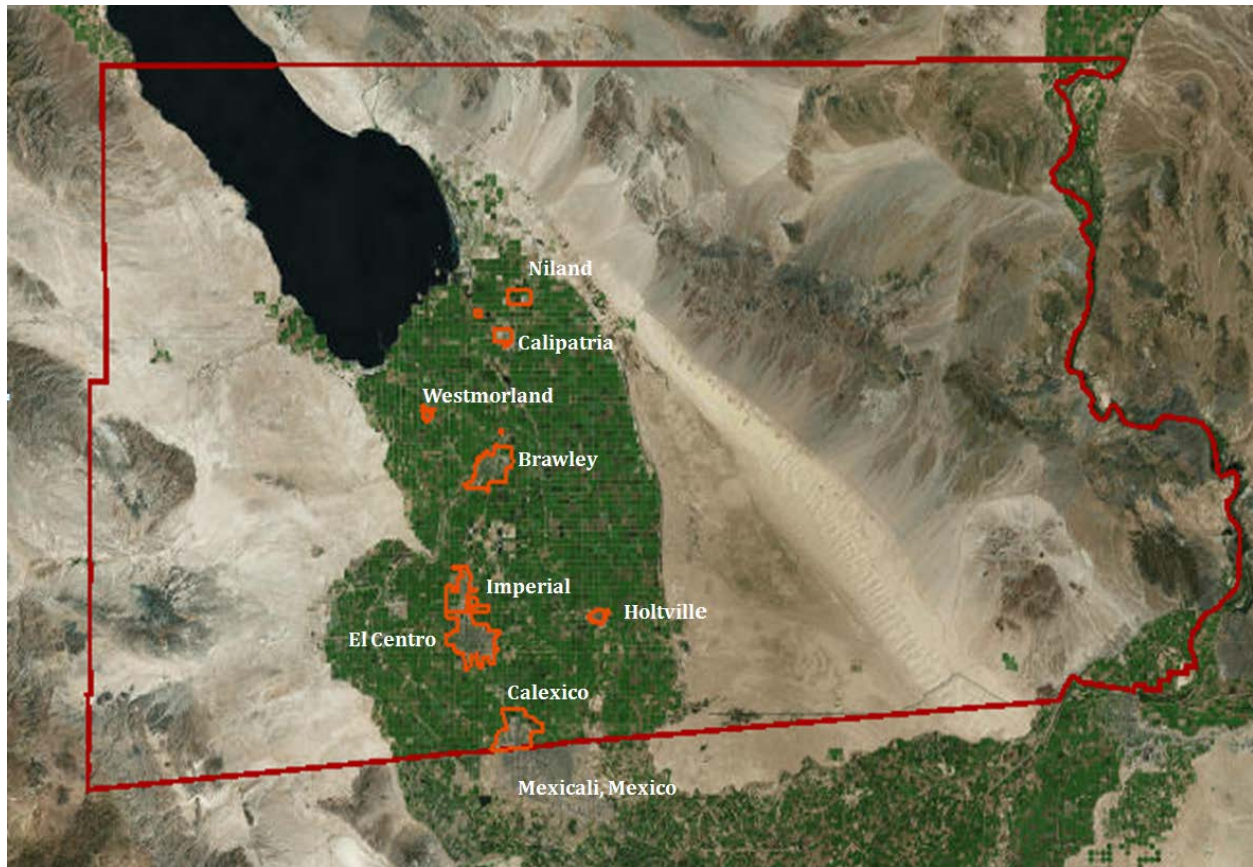


Fig 2-6: Depicts the seven incorporated cities within Imperial County - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

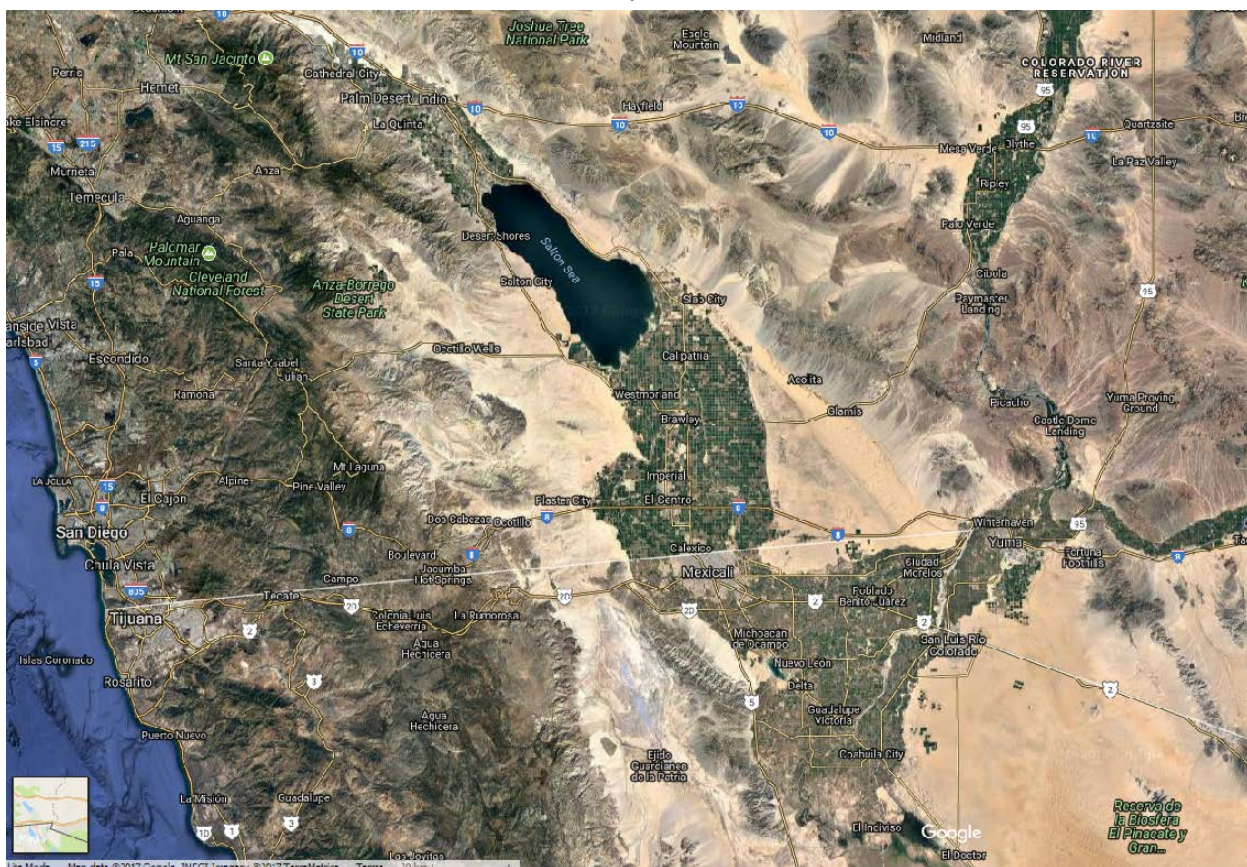


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County.

Source: Google Earth Terra Metrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1**).

As mentioned above, the PM_{10} exceedance on May 5, 2016, occurred at the Brawley, Niland, and Westmorland monitors. The Brawley, Niland, and Westmorland monitors are regarded as the “northern” monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on May 5, 2016, varying meteorological sites were used such as airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and when relevant to the wind event, meteorological sites within northern Mexico. (**Figure 2-8 and Appendix B**).

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

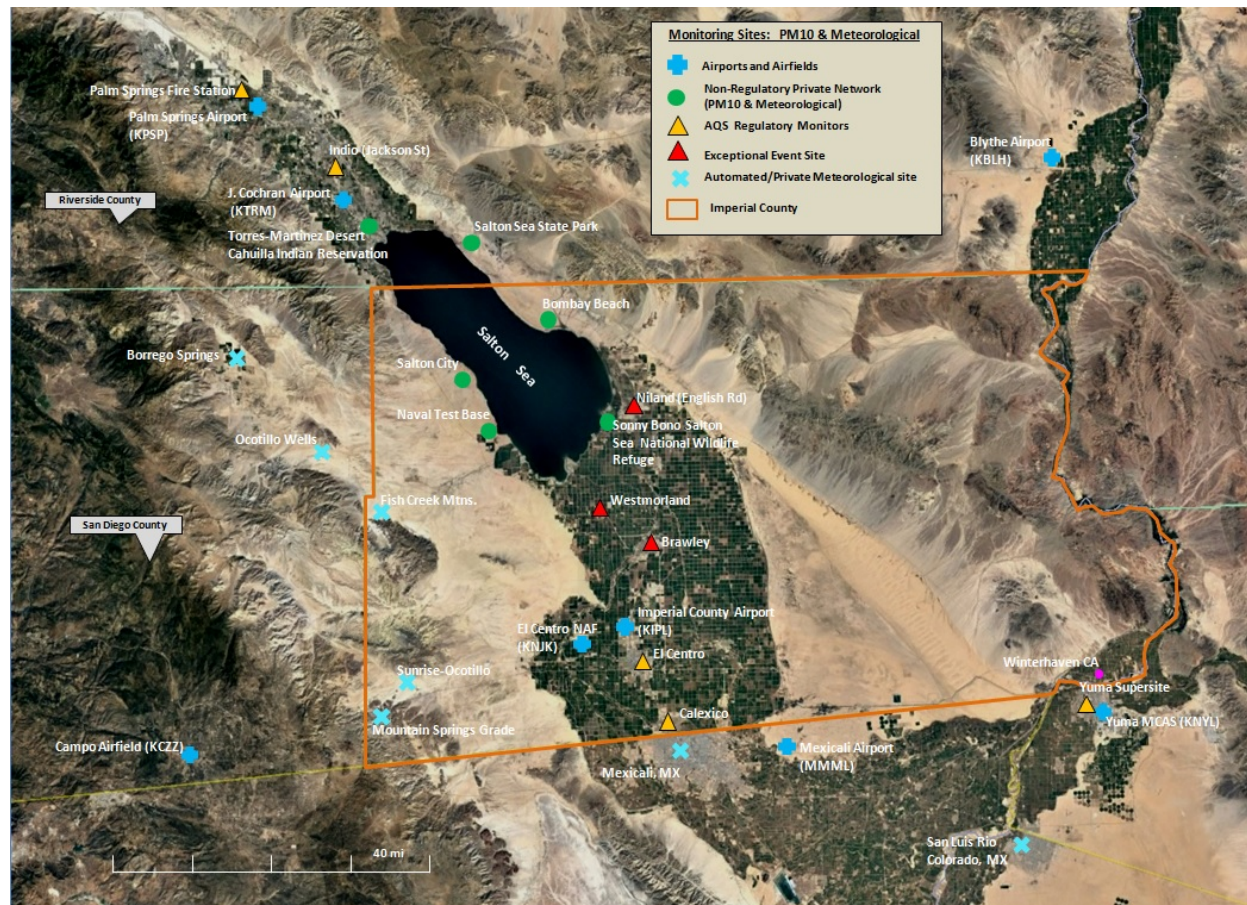


Fig 2-8: Depicts a select group of meteorological and PM₁₀ monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM₁₀ sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These stations are privately owned and non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062°W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593°W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and

115.62310°W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

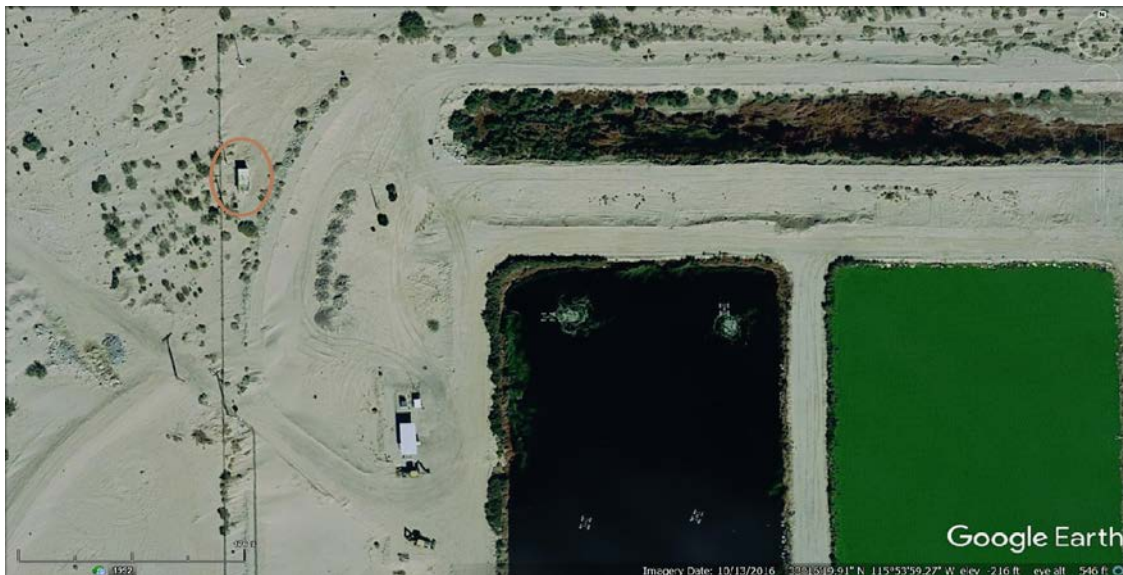


Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. Site photos can be seen at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST



Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph is taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION



Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST



Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph is taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION



Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

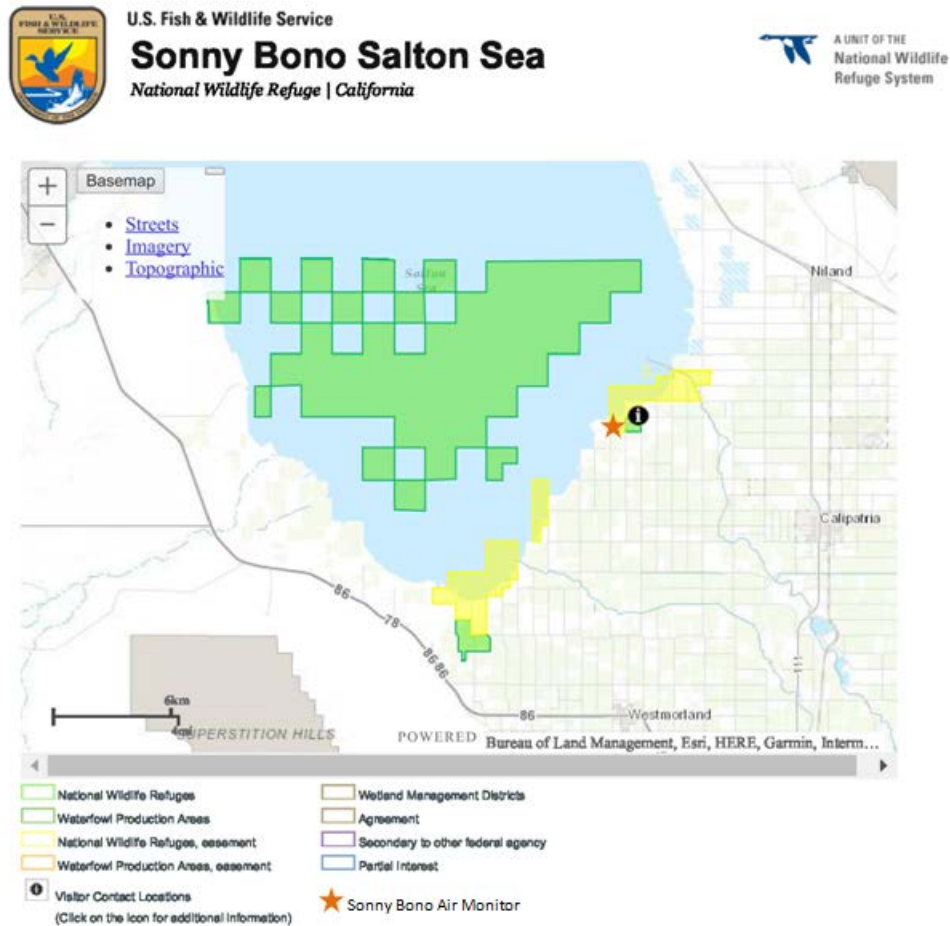


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
MAY 5, 2016

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM ₁₀ (µg/m ³) Avg	1-hr PM ₁₀ (µg/m ³) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric BAM 1020	06-025-0007	(81102)	13701	-15	- 163	- 567	- 18:00	-	-
Calexico-Ethel Street	CARB	BAM 1020	06-025-0005	(81102)	13698	3	125	543	16:00	18.4	16:00
El Centro-9th Street	ICAPCD	BAM 1020	06-025-1003	(81102)	13694	9	85	185	15:00	17.9	14:00
Niland-English Road	ICAPCD	Hi-Vol Gravimetric BAM 1020	06-025-4004	(81102)	13997	-57	- 172	- 995	- 16:00	29.5	16:00
Westmorland	ICAPCD	BAM 1020	06-025-4003	(81102)	13697	-43	227	557	14:00	13.4	17:00
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	17	25	00:00	8	01:00
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	49.7	89	15:00	14	07:00
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	122.3	609	17:00	-	-

*CARB = California Air Resources Board

*ICAPCD = Air Pollution Control District, Imperial County

*SCAQMD = South Coast Air Management Quality District

*ADEQ = Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km²). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15 SONORAN DESERT REGION

The Sonoran Desert Region consists of the Sonoran Desert itself plus the surrounding biological communities, including the Sea of Cortez (Gulf of California) and its islands

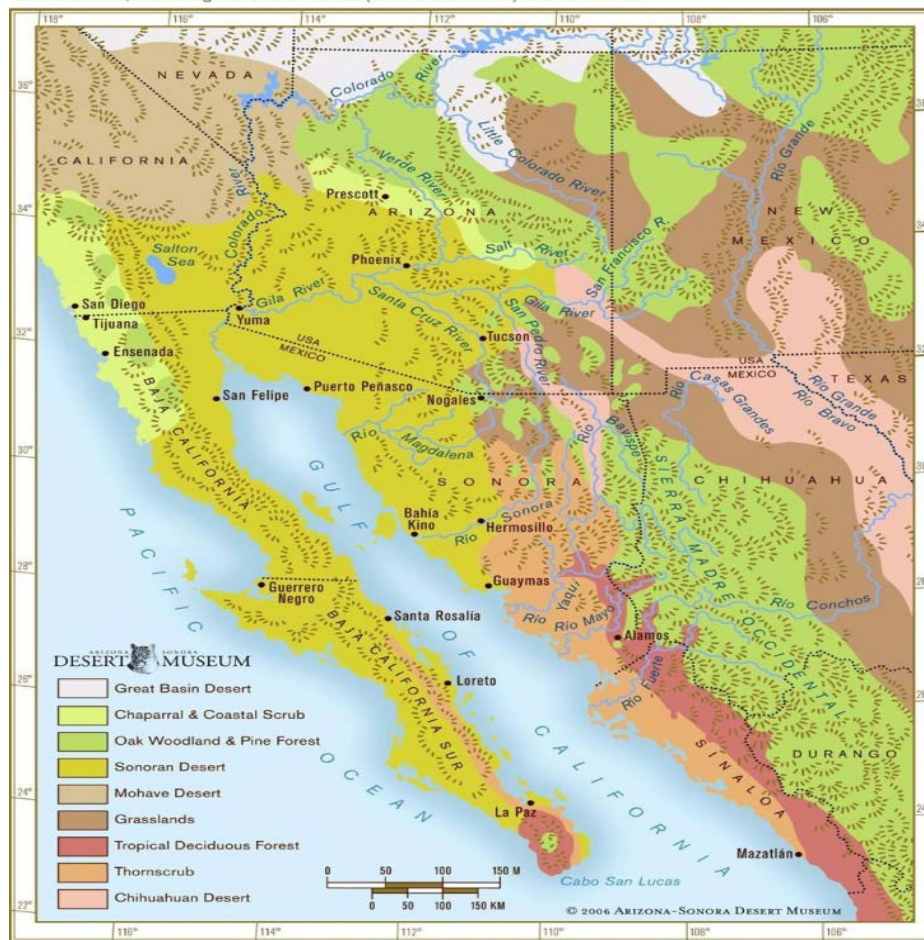


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at <http://desertmuseum.org/center/map.php>

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northernmost extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences

frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 2.64" (**Figure 2-16**). During the 12-month period prior to May 5, 2016 Imperial County measured total annual precipitation of only 1.16 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

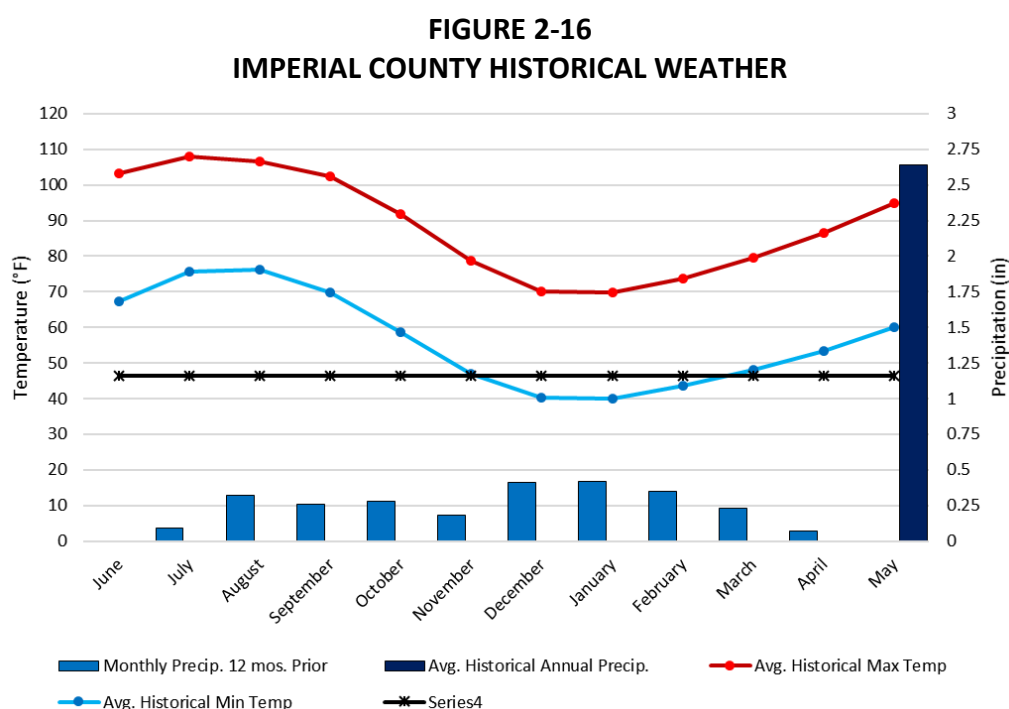


Fig 2-16: Historical Imperial County weather. Prior to May 5, 2016, the region had suffered abnormally low total precipitation of 1.16 inches. Average annual precipitation is 2.64 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground <http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713>.

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.⁴ Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically high pressure brings clear skies and with no clouds there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for May 5, 2016, which was caused by a Pacific storm system that moved into the region, brought gusty west winds from the mountain crests east and into parts of the desert. Essentially, a massive Pacific low pressure system off the central and southern California coast moved inland. The strong low level front pushed through the region strengthening the pressure gradient at the surface creating gusty westerly winds across the region and into Imperial County. There was enough instability that rain accompanied the gusty winds, Times of San Diego, in San Diego County. **Figures 2-17 through 2-19** provides information regarding the upper level low, the surface low, and the associated cold front as it moved through southern California.

⁴ NWS JetStream – Origin of Wind <http://www.srh.noaa.gov/jetstream/synoptic/wind.html>

FIGURE 2-17
UPPER LEVEL TROUGH APPROACHES REGION

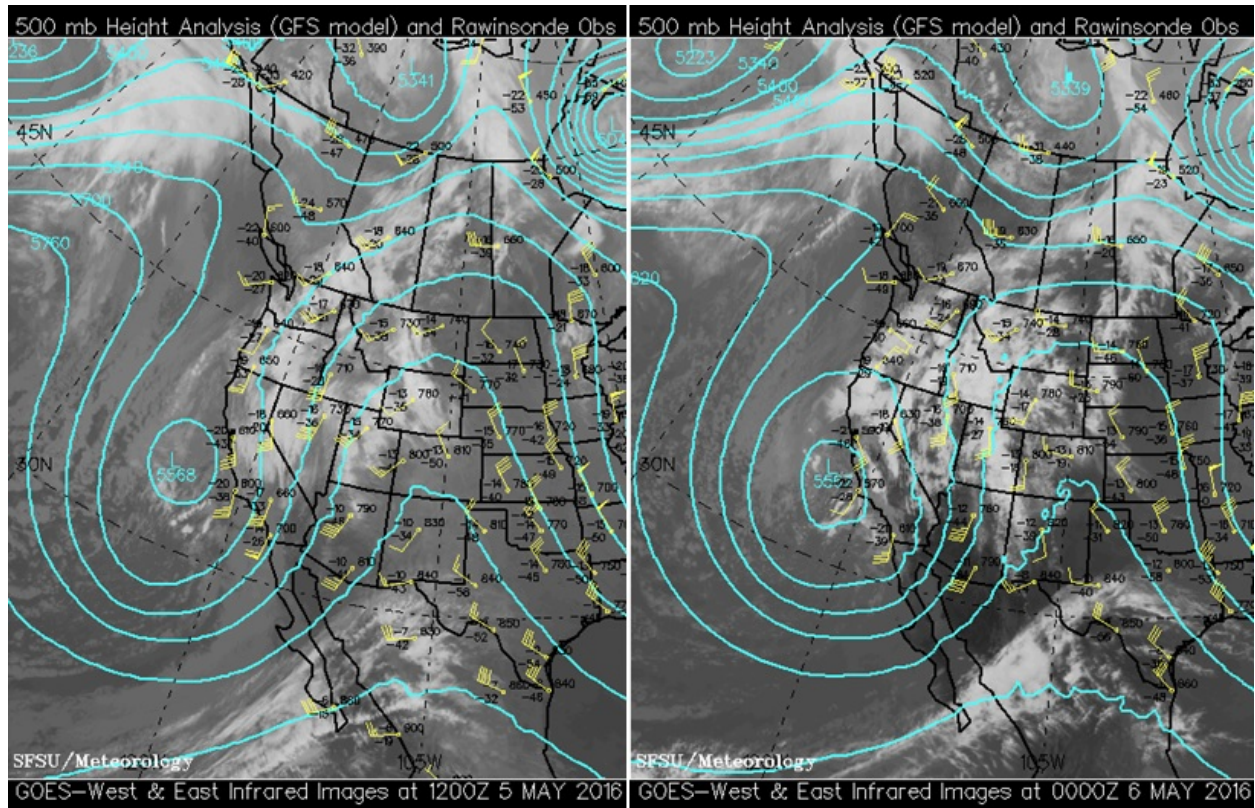


Fig 2-17: A pair of GOES E-W infrared satellite images (left, 0400 PST; right, 1600 PST May 5, 2016) at the 500mb height indicates the upper level trough moving inland over the region then southward over southern California. The deepening of the low caused a tightening of the pressure gradient at the surface, which led to conditions conducive to high winds across southeastern California Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://virga.sfsu.edu/archive/composites/sathts_500/1605

FIGURE 2-18
SURFACE GRADIENT TIGHTENS

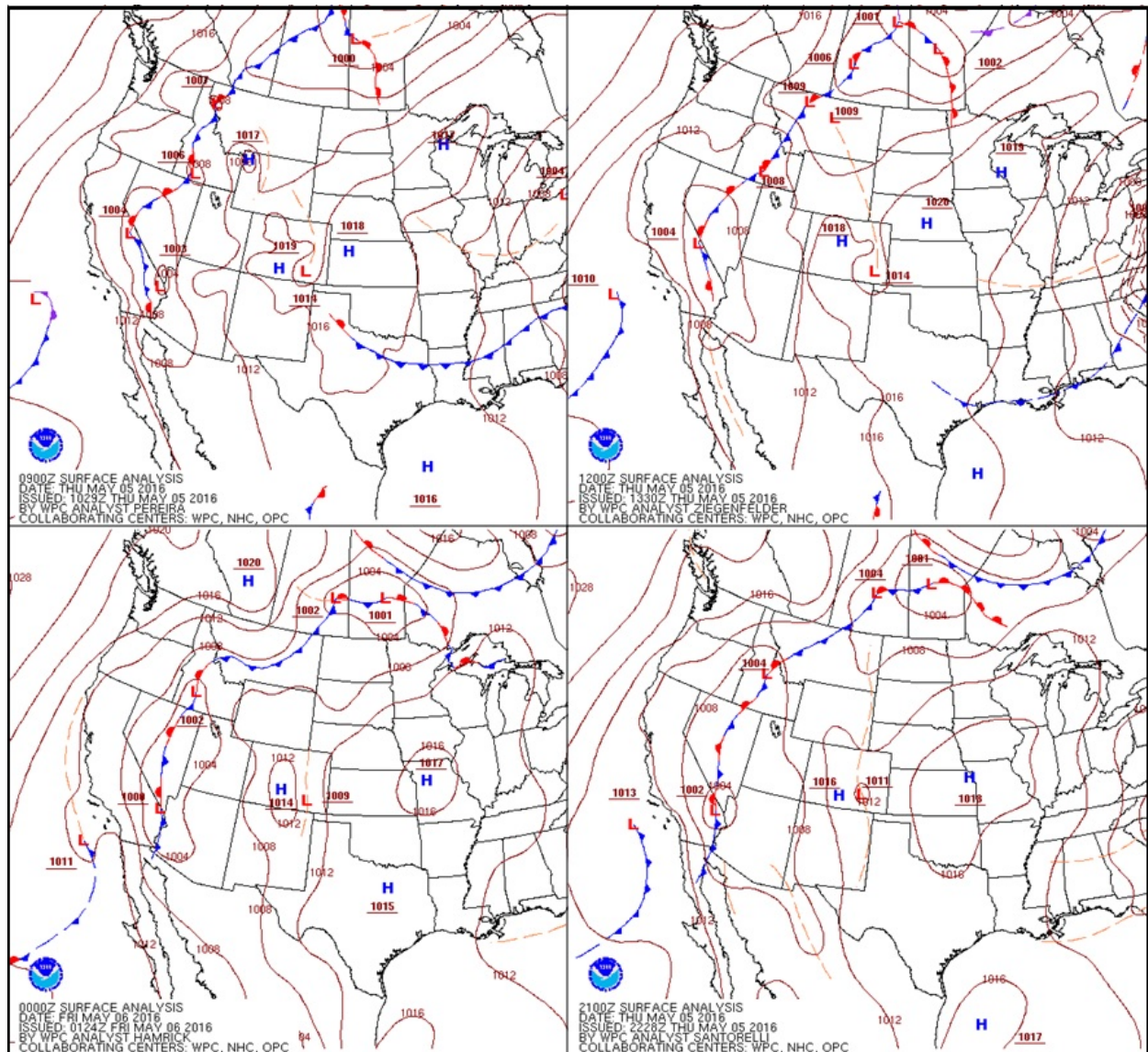


Fig 2-18: A quad of surface analysis maps show the tightening of the surface gradient and the progression of a cold front through the region on May 5, 2016. The weather system was responsible for the gusty winds across southeastern California and Imperial County. Clockwise, from top left: 0100; 0400; 1300; 1600 PST. El Centro NAF was reporting winds of 28 mph and gusts of 36 mph at 0456 PST. Strong winds and gusts continued through much of the day. NWS Weather Prediction Center Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php

FIGURE 2-19
GUSTY WINDS ACROSS THE REGION

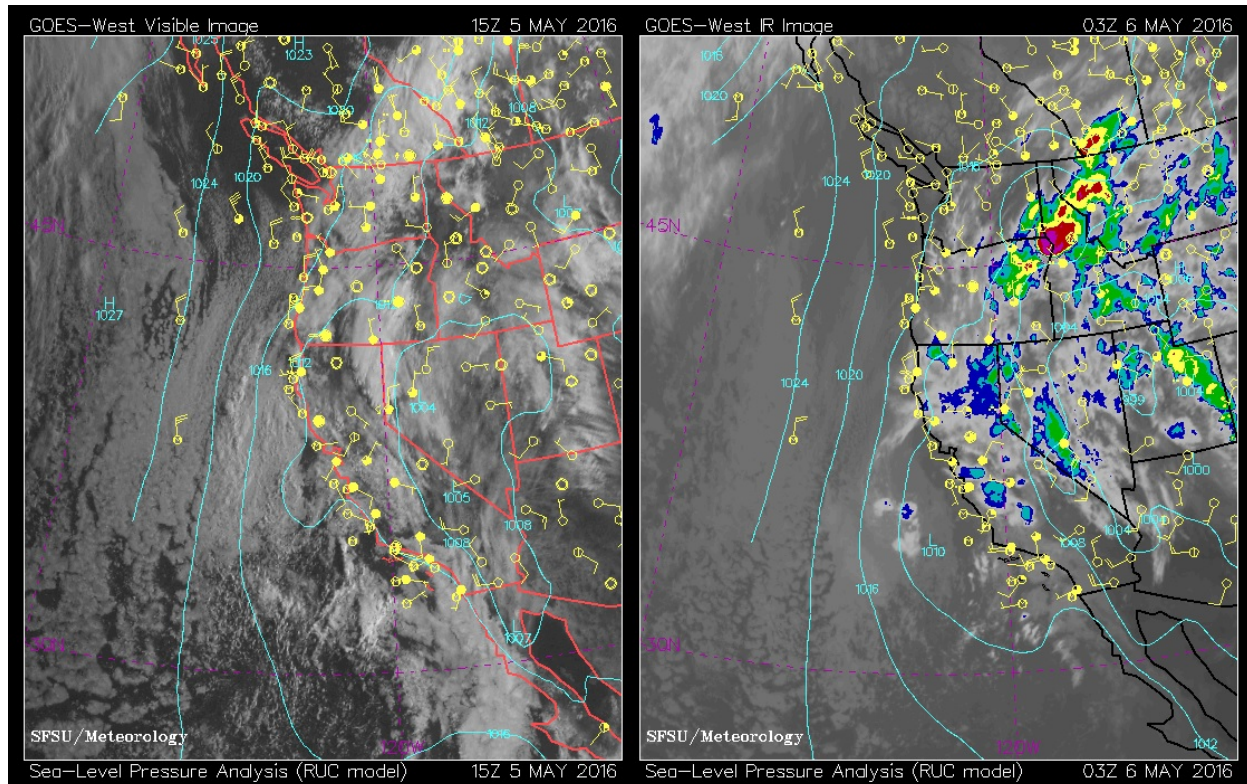


Fig 2-19: A pair of GOES-W visible (left) and infrared (right) satellite images captured at 0700 and 1900 PST on May 5, 2016. The images were captured when the Imperial County Airport and the El Centro NAF reported gusty winds. Wind barbs for both images depict westerly winds of at least 23 mph. Local airfields reported winds above the 25 mph threshold. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

The intensity of the Pacific weather system prompted the San Diego and Phoenix NWS offices to issue weather stories, weather briefings and Urgent Weather messages. The San Diego NWS office issued its Urgent Weather message advising of strong gusty winds later Thursday afternoon and night. Winds were forecast between 25 to 35mph and gusts above 50mph for mountains and desert areas. The wind advisory contained in the Urgent Weather message was effect through the early morning hours on Friday, May 6, 2016. The Phoenix NWS office began issuing weather briefings as early as May 2, 106 advising of blowing dust due to enhanced and breezy windy conditions for all areas. Finally, the “[d]escriptive text narrative for smoke/dust observed in Satellite imagery through 0300Z May 6, 2016” described dense blowing dust across the interior of far southern California, far northern Baja, northwestern Mexico and western and north central Arizona, confirming the region effect of the May 5, 2016 event. **Figure 2-20** is a graphical illustration of the chain of events for May 5, 2016.

FIGURE 2-20
RAMP-UP ANALYSIS MAY 5, 2016

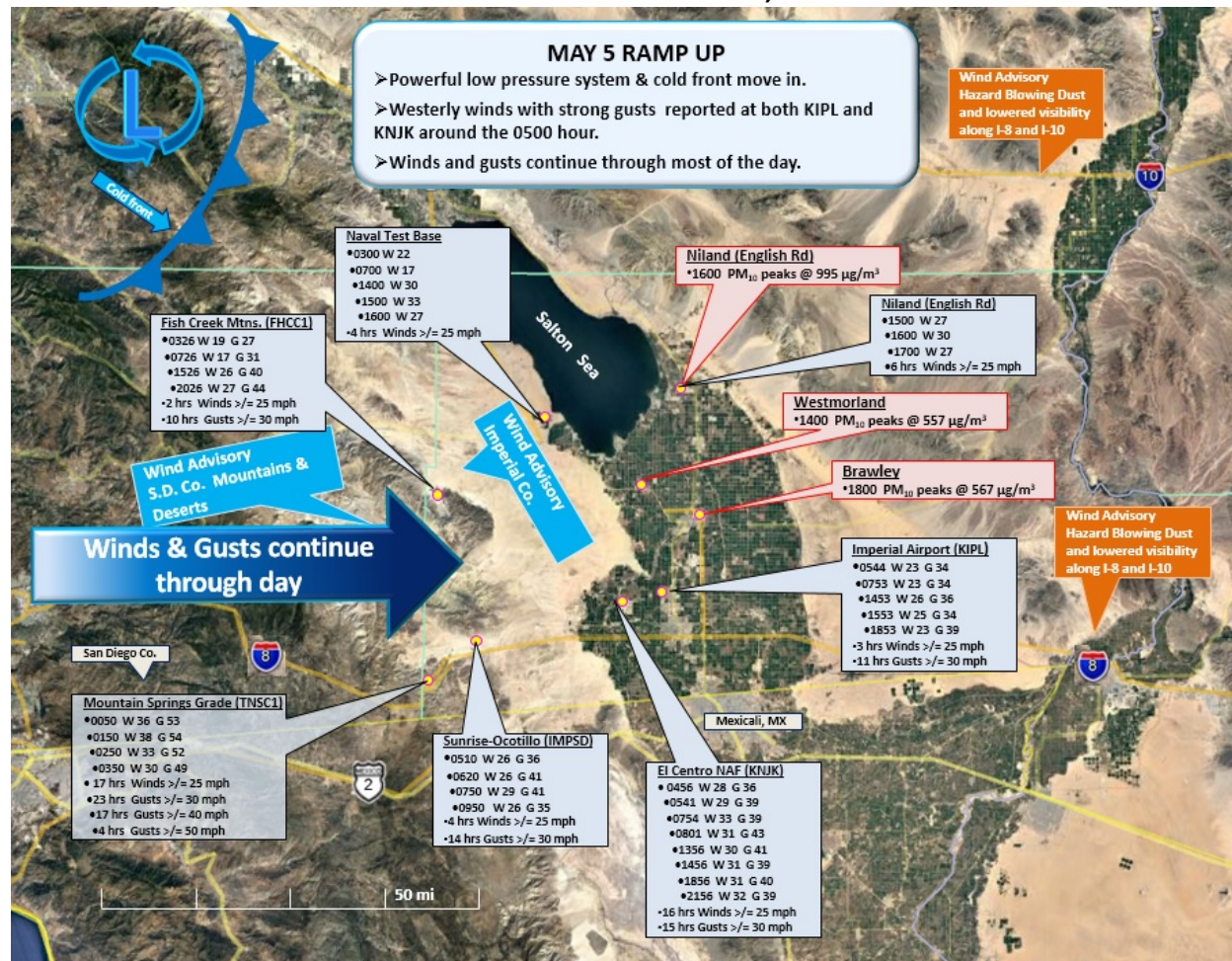


Fig 2-20: Both the Imperial County airport (KIPL) and the El Centro Naval Air Facility (KNJK) reported multiple hours of winds at or above the 25 mph threshold. Breezy winds prevailed during the early morning hours and increased to strong gusty winds by 5:00am PST May 6, 2016. Note that all three monitors reached peak concentration during the afternoon hours on May 6, 2016. Air quality data from the EPA's AQS data bank. Wind data for KIPL and KNJK from the NCEI's QCLCD system. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali, Mexico. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON MAY 5, 2016

Station Monitor	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM ₁₀ correlated to time of Max Wind Speed			
Airport Meteorological Data						Brlly	Wstml d	CX	Nlnd
IMPERIAL COUNTY									
Imperial Airport (KIPL)	26	270	14:53	39	18:53	206	557	366	164
Naval Air Facility (KNJK)	33	260	7:54	43	8:01	118	318	64	107
Calexico (Ethel St)	18.4	292	16:00	-	-	521	468	543	995
El Centro (9th Street)	17.9	275	14:00	-	-	206	557	366	164
Niland (English Rd)	29.5	265	16:00	-	-	521	468	543	995
Westmorland	13.4	272	17:00	-	-	405	446	84	386
RIVERSIDE COUNTY									
Blythe Airport (KBLH)	23	180	12:52	31	12:52	60	59	40	71
Palm Springs Airport (KPSP)	24	320	12:53	33	12:53	60	59	40	71
Jacqueline Cochran Regional Airport (KTRM) - Thermal	21	350	13:52	26	13:52	158	171	40	142
ARIZONA - YUMA									
Yuma MCAS (KNYL)	22	150	15:57	29	19:57	482	370	420	820
MEXICALI - MEXICO									
Mexicali Int. Airport (MXL)	28.7	300	16:40	-	-	521	468	543	995

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory model,⁵ depicted in **Figure 2-21** indicates the general path of the airflow as it approached Brawley (blue icon), Westmorland (red icon), and Niland (green icon).

The six-hour back-trajectory ends at Westmorland and Brawley at 1600 PST, which correlates to the measured peak concentrations during the 1400 hour through the 1800 hour PST. Strong winds entrained fugitive windblown dust particles from mountain and desert soils to the west and southwest of Imperial County affecting PM₁₀ monitors throughout southeastern California and Arizona. The trajectories illustrate a typical scenario when west and southwest winds (airflow) funnel through the mountain passes, many times increasing in speed, and down the desert slopes of San Diego County onto the valley floor. Strong westerly winds typically blow through these mountain passes and desert slopes entraining PM₁₀ across the desert floor and

⁵ The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's [MODIS](#) satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind. The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

agricultural lands within Imperial County. It is of some worth to point out that from time to time modeled winds can differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

FIGURE 2-21
HYSPLIT MODELS

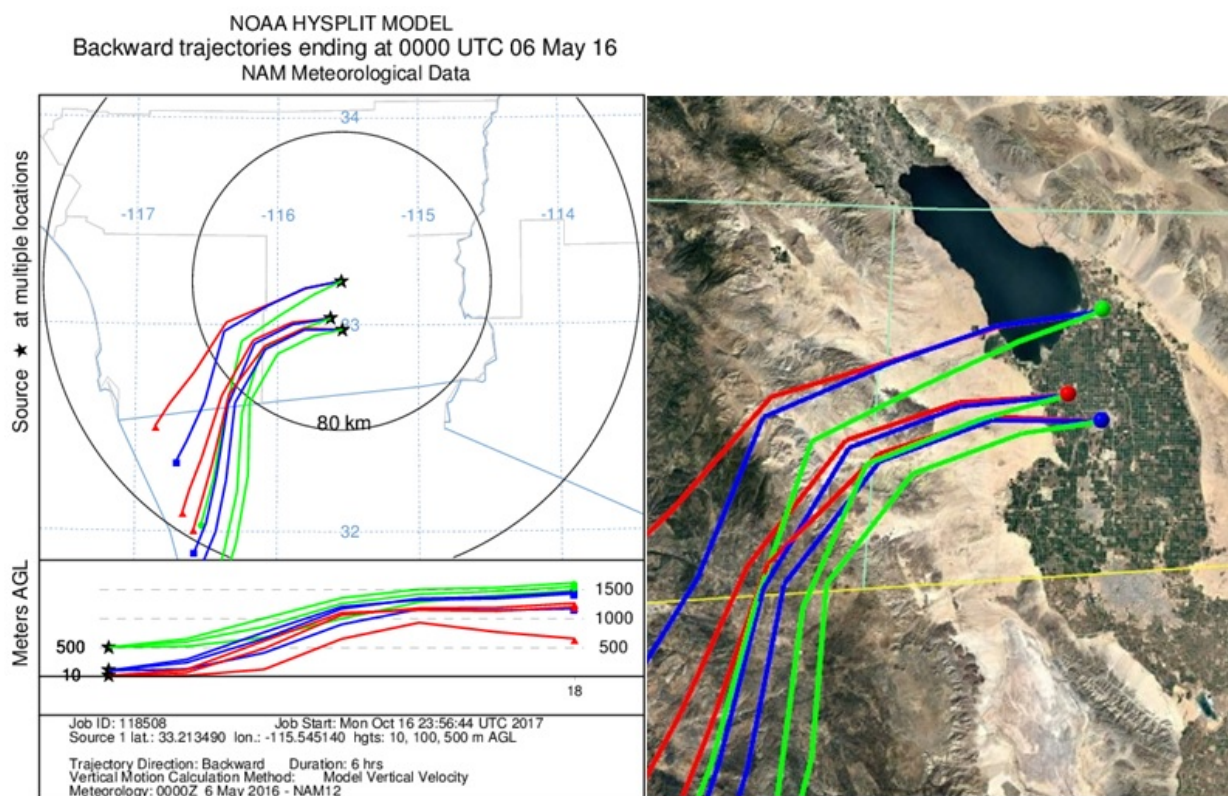


Fig 2-21: A 6-hour back trajectory ending at 1600 PST. This was during the period that the Brawley, Niland, and Westmorland FEM monitors were reporting high hourly concentrations. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figures 2-22 and 2-23 illustrate the elevated levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma Counties for a total of three days, May 4, 2016 through May 6, 2016. Elevated emissions entrained into Imperial County affected the Brawley, Niland, and Westmorland monitors when gusty west winds, associated with the passage of a low-pressure system and cold front passed through Imperial County on May 5, 2016. The Brawley, Niland, and Westmorland monitors measured the highest elevated concentrations during the afternoon hours beginning at 14:00 PST coincident with elevated winds at 25 mph and gusts over 30.

The resulting entrained dust and accompanying high winds from the system qualify this event as a “high wind dust event”.⁶ High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the May 5, 2016 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

FIGURE 2-22
72-HOUR WIND SPEEDS: REGIONAL SITES

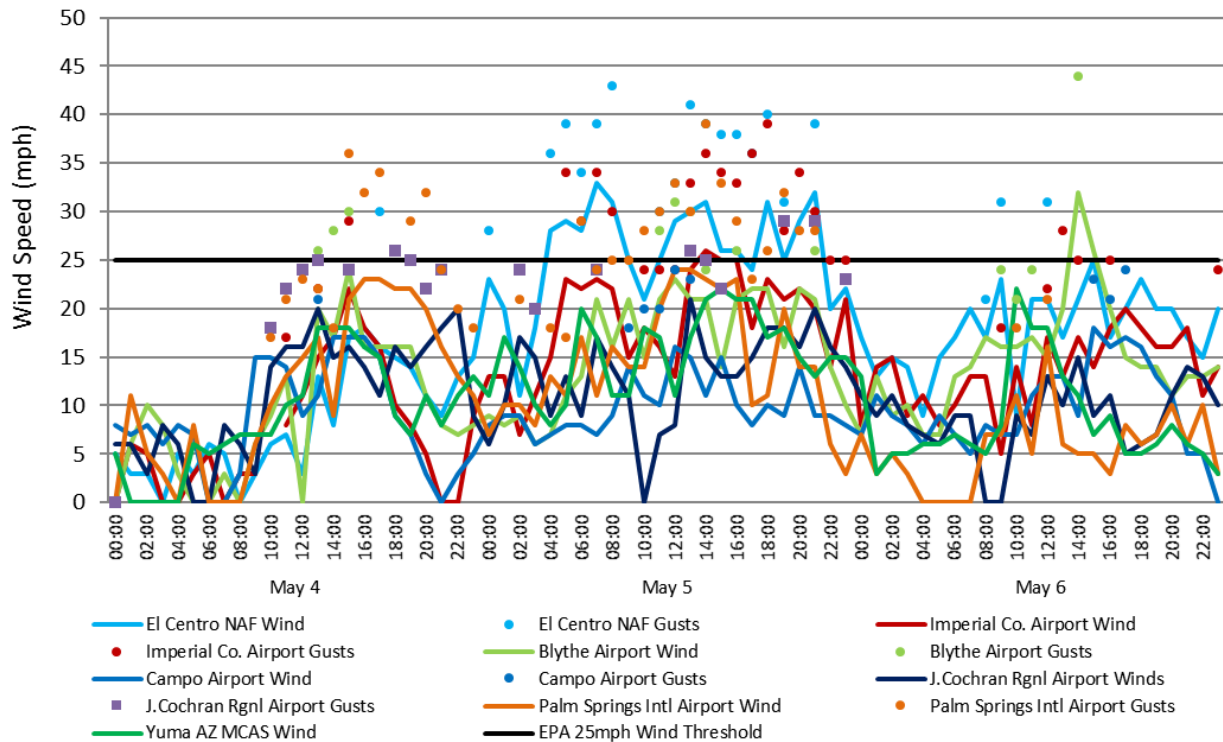


Fig 2-22: The regional effect of the high winds is reflected by the jump in wind speeds at airfields starting around 00:00 PST on May 5, 2016 and for the most part, increasing through much of the day. Imperial County Airport and El Centro NAF had winds above the 25 mph threshold. Wind Data from the NCEI’s QCLCD system. Individual wind station graphs are located in **Appendix B**.

⁶ Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-23
72-HOUR PM₁₀ CONCENTRATIONS AT VARIOUS SITES

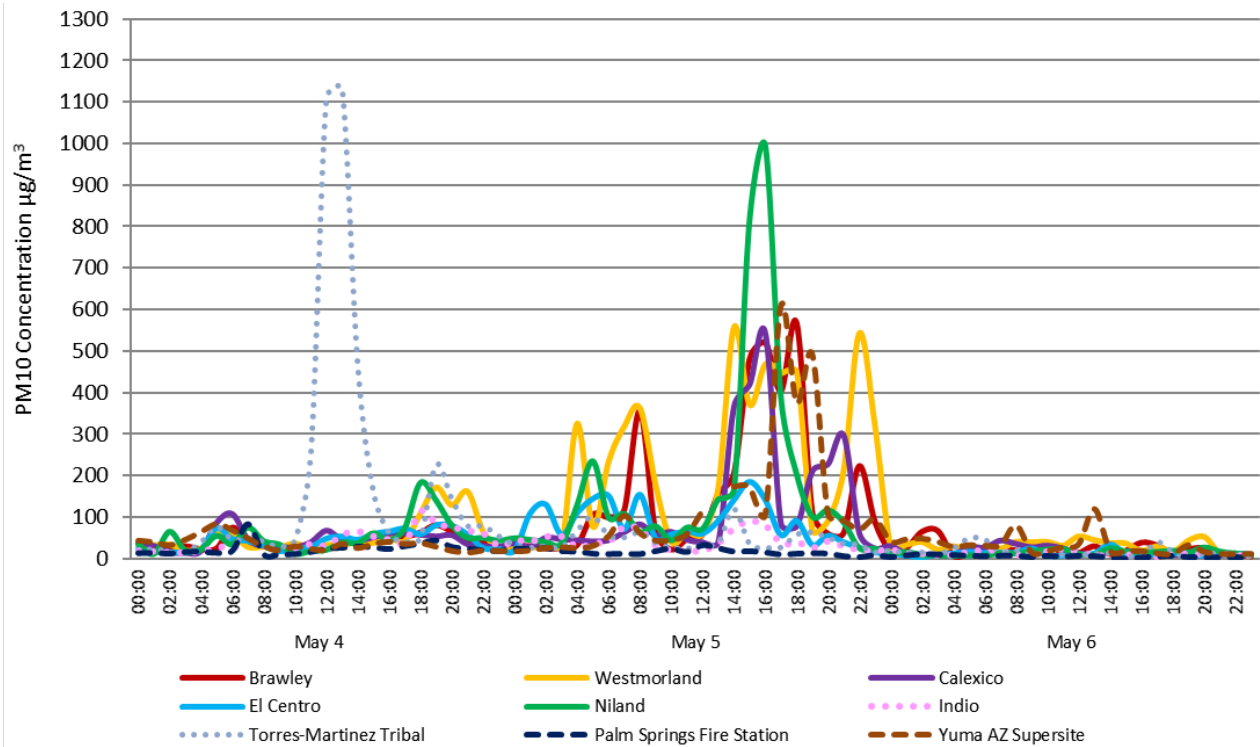


Fig 2-23: Is the graphical representation of the 72 hour relative PM₁₀ concentrations at various sites in California and Arizona. The elevated PM₁₀ concentrations at nearly all sites on May 5, 2016, demonstrate the regional impact of the weather system and accompanying winds. Air quality data from the EPA's AQS data bank

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM₁₀ concentrations measured at the Brawley, Niland, and Westmorland monitors on May 5, 2016, were compared to non-event and event days demonstrating the variability over several years and seasons. The analysis, also, provides supporting evidence that there exists a clear causal relationship between the May 5, 2016 high wind event and the exceedance measured at the Brawley, Niland, and Westmorland monitors.

Figures 3-1 through 3-6 show the time series of available FRM and BAM 24-hr PM₁₀ concentrations at the Brawley and Westmorland stations for the period of January 1, 2010 through May 5, 2016. Note that prior to 2013, the BAM data was not considered FEM and was not reported into AQS.⁷ In order to properly establish the variability of the event as it occurred on May 5, 2016, 24-hour averaged PM₁₀ concentrations between January 1, 2010 and May 5, 2016 were compiled and plotted as a time series. All six figures illustrate that the exceedance, which occurred on May 5, 2016, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs was obtained through the EPA's AQS data bank.

⁷ Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM₁₀ concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m³) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM₁₀ concentrations to PM₁₀ concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL
FRM AND FEM PM₁₀ 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MAY 5, 2016

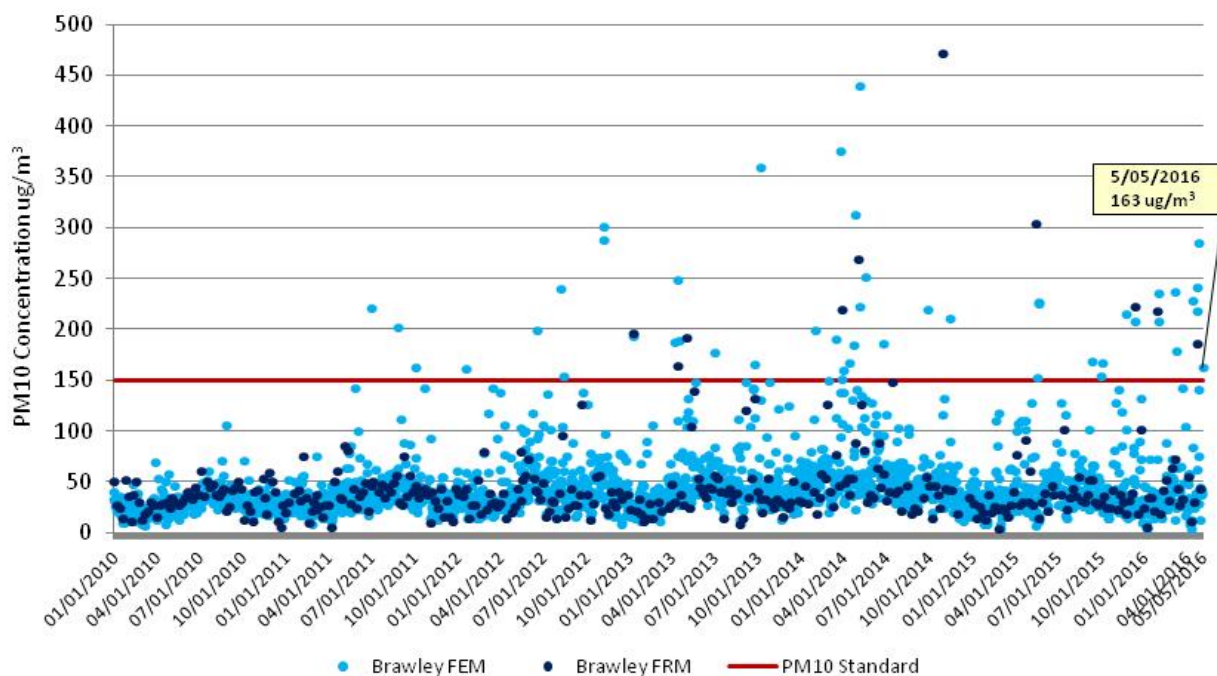


Fig 3-1: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 163 µg/ by the Brawley BAM 1020 PM₁₀ monitor was outside the normal historical concentrations when compared to similar days and non-event days. The far vast number of samples fall way below the exceedance threshold.

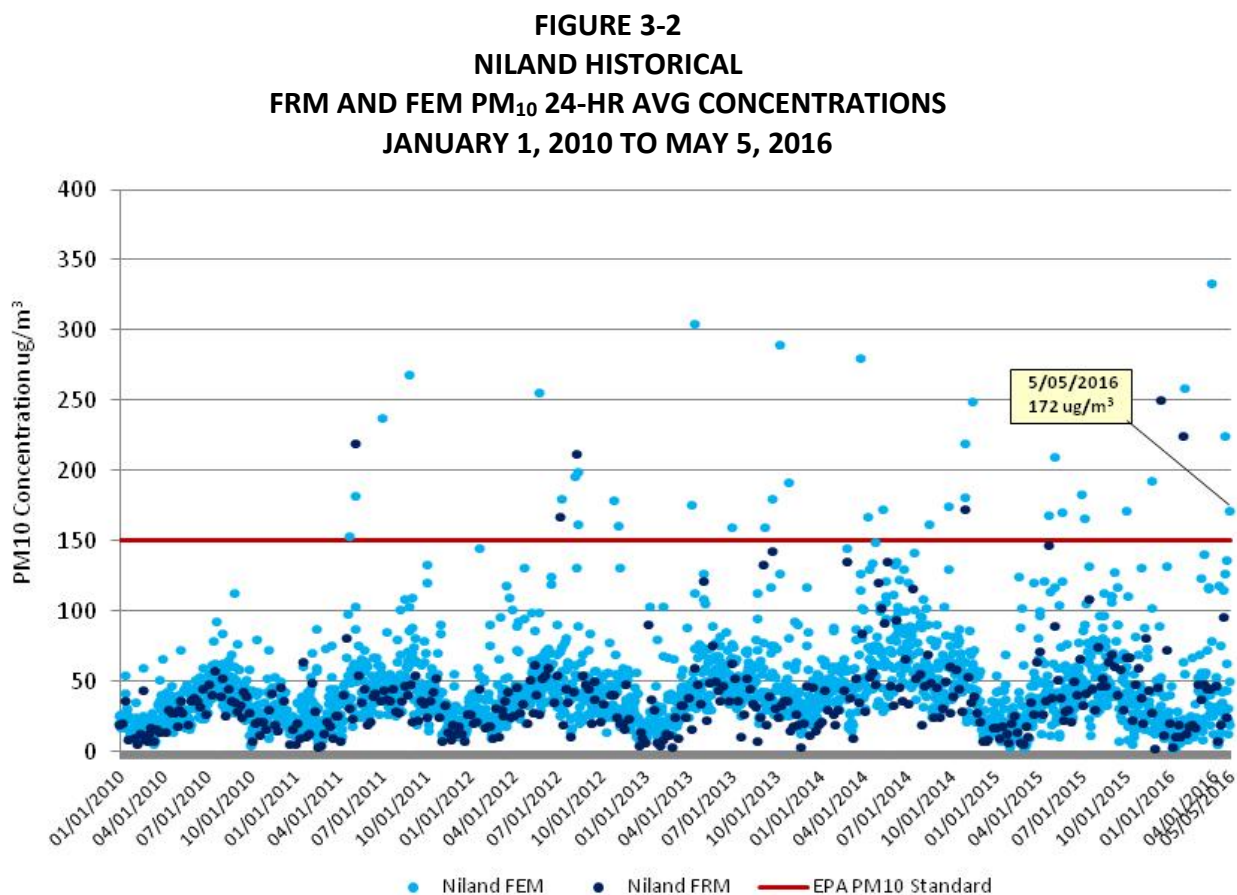


Fig 3-2: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 172 $\mu\text{g}/\text{m}^3$ by the Niland BAM 1020 PM₁₀ monitor was outside the normal historical concentrations when compared to similar days and non-event days. The far vast number of samples fall way below the exceedance threshold.

FIGURE 3-3
WESTMORLAND HISTORICAL
FRM AND FEM PM₁₀ 24-HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MAY 5, 2016

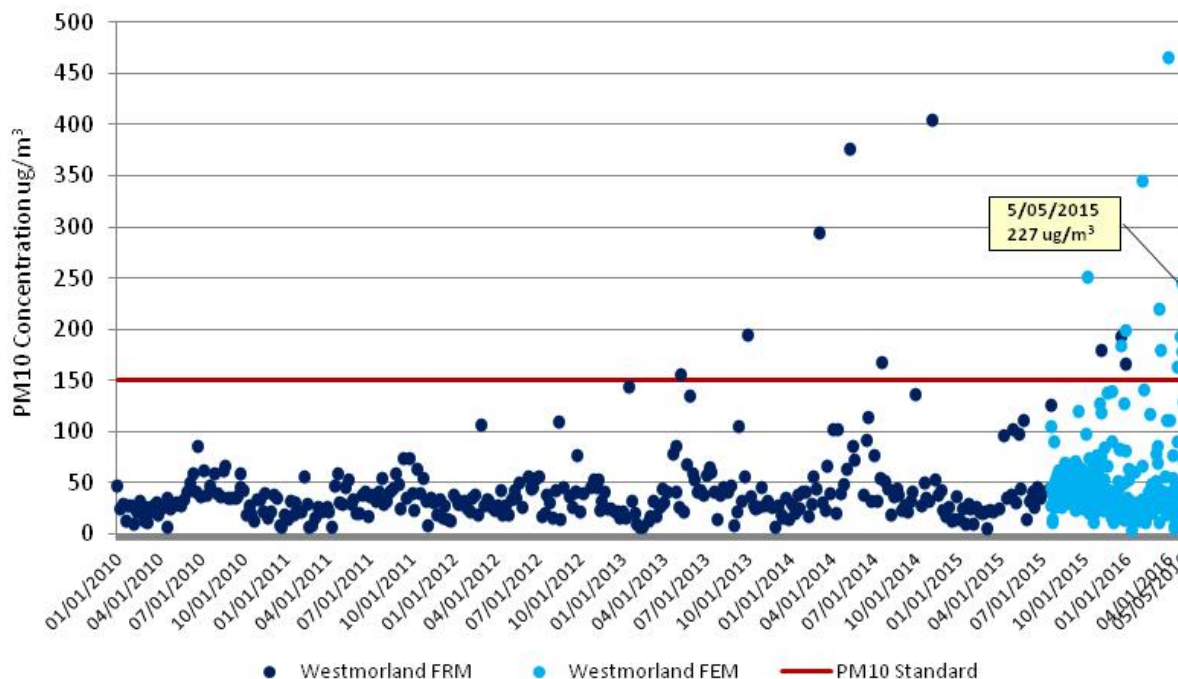
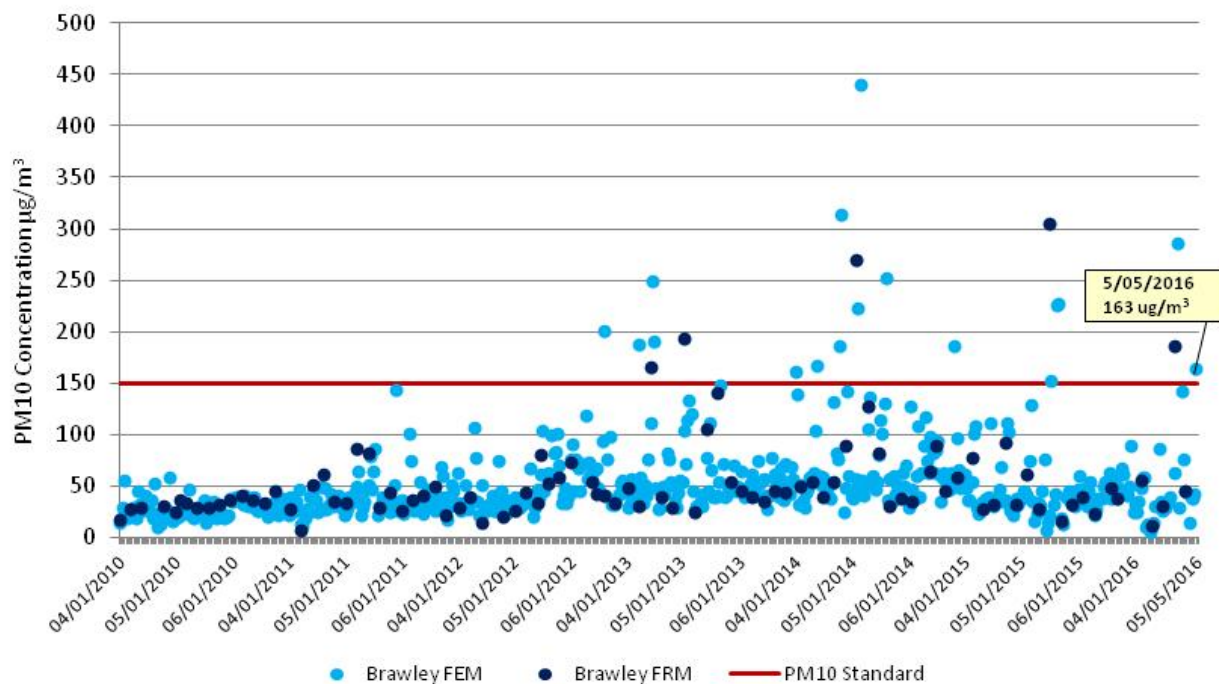


Fig 3-3: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 227 $\mu\text{g}/\text{m}^3$ by the Westmorland BAM 1020 PM₁₀ monitor was outside the normal historical measurements. The far vast number of samples fall way below the exceedance threshold.

The time series, **Figures 3-1 through 3-3** for Brawley, Niland, and Westmorland, included 2,317 sampling days (January 1, 2010 through May 5, 2016). During this period the Brawley station (**Fig. 3-1**) recorded 2,683 credible samples, measured by either FRM or FEM monitors between January 1, 2010 and May 5, 2016. Overall, the time series illustrates that of the 2,683 credible samples measured during there was a total of 48 exceedance days, which is a 1.8% occurrence rate. The Niland station (**Fig. 3-2**) recorded 2,681 credible samples measured by either FRM or FEM monitors between January 1, 2010 and May 5, 2016. Only 41 exceedance days were measured during this period. This translates into just 1.5% of all samples. Westmorland station (**Fig. 3-3**) recorded 653 credible samples measured by either FRM or FEM monitors between January 1, 2010 and May 5, 2016. Only 19 exceedance days were measured during this period. This translates into just 2.9% of all samples. As mentioned above, FEM BAM data was not considered regulatory from 2010 to 2012.

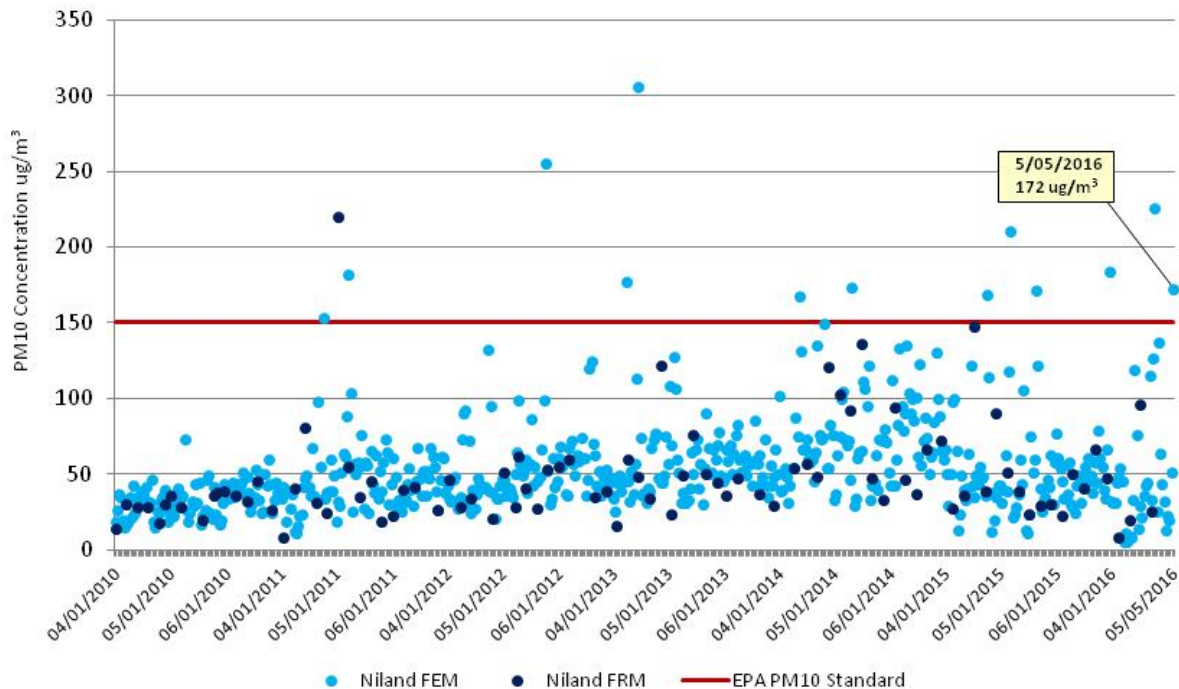
FIGURE 3-4
BRAWLEY SEASONAL COMPARISON
PM₁₀ 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 THROUGH MAY 5, 2016**



*April 1, 2010 to June 2015 and April 1, 2016 to May 5, 2016

Fig 3-4: A comparison of PM₁₀ seasonal concentrations demonstrates that the measured concentration of 163 $\mu\text{g}/\text{m}^3$ by the Brawley BAM 1020 PM₁₀ monitor was outside the normal seasonal concentrations when compared to similar days and non-event days. The far vast number of samples fall way below the exceedance threshold.

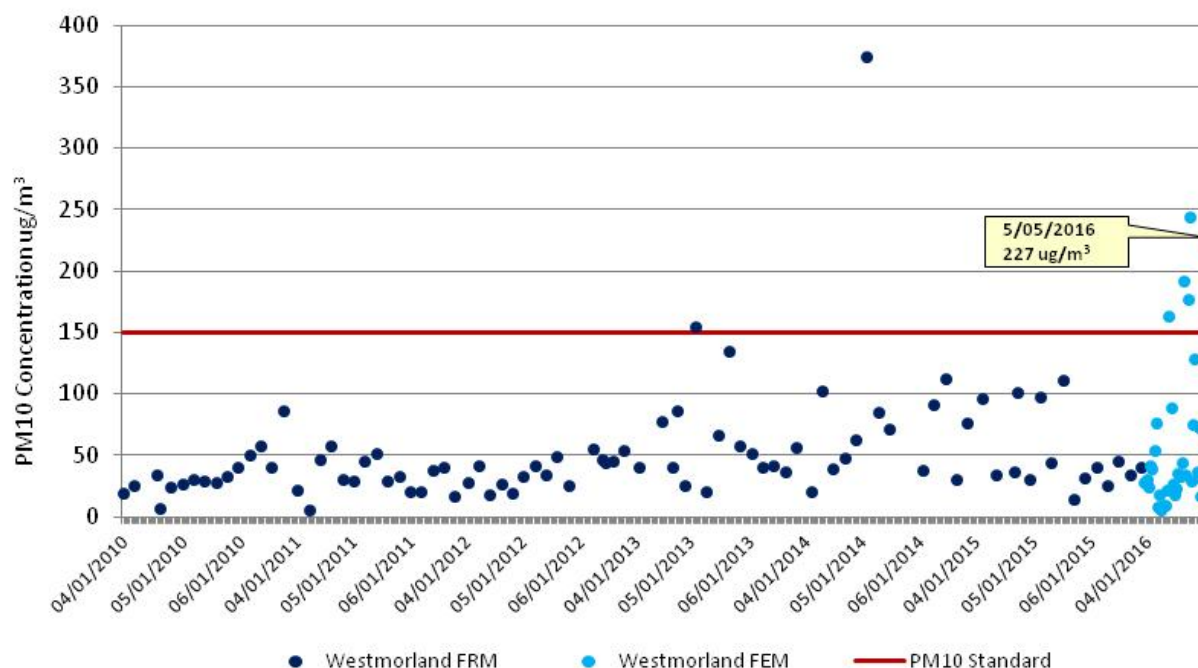
FIGURE 3-5
NILAND SEASONAL COMPARISON
PM₁₀ 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 THROUGH MAY 5, 2016**



*April 1, 2010 to June 2015 and April 1, 2016 to May 5, 2016

Fig 3-5: A comparison of PM₁₀ seasonal concentrations demonstrates that the measured concentration of 172 $\mu\text{g}/\text{m}^3$ by the Niland BAM 1020 PM₁₀ monitor was outside the normal seasonal measurements. The far vast number of samples fall way below the exceedance threshold.

FIGURE 3-6
WESTMORLAND SEASONAL COMPARISON
PM₁₀ 24-HR AVG CONCENTRATIONS
***APRIL 1, 2010 THROUGH MAY 5, 2016**



*April 1, 2010 to June 2015 and April 1, 2016 to May 5, 2016

Fig 3-6: A comparison of PM₁₀ seasonal concentrations demonstrates that the measured concentration of 227 $\mu\text{g}/\text{m}^3$ by the Westmorland BAM 1020 PM₁₀ monitor was outside the normal seasonal measurements. The far vast number of samples fall way below the exceedance threshold.

Figures 3-4 through 3-6 display the seasonal fluctuations over 581 sampling days at the Brawley, Niland, and Westmorland stations for months April through June of years 2010 through 2016 (2016 ending May 5). The seasonal sampling period for Brawley (**Figure 3-4**) contains 674 combined FRM and FEM credible samples. Of these, 21 exceedance days occurred which translates into just 3.1 percent of all samples. The seasonal sampling period for Niland (**Figure 3-5**) contains 671 combined FRM and FEM credible samples. Of these, only 15 exceedance days occurred which translates into just 2.2% percent of all samples. The seasonal sampling period⁸ for Westmorland (**Figure 3-6**) contains 123 credible samples and only six exceedance days. This equates to 4.8% of all credible samples.

⁸ FEM sampling at the Westmorland site began July 2015 therefore January is the only seasonal first-quarter data available.

Figures 3-7 through 3-9 display percentile rankings for Brawley, Niland, and Westmorland over the historical period of January 2010 through May 5, 2016.

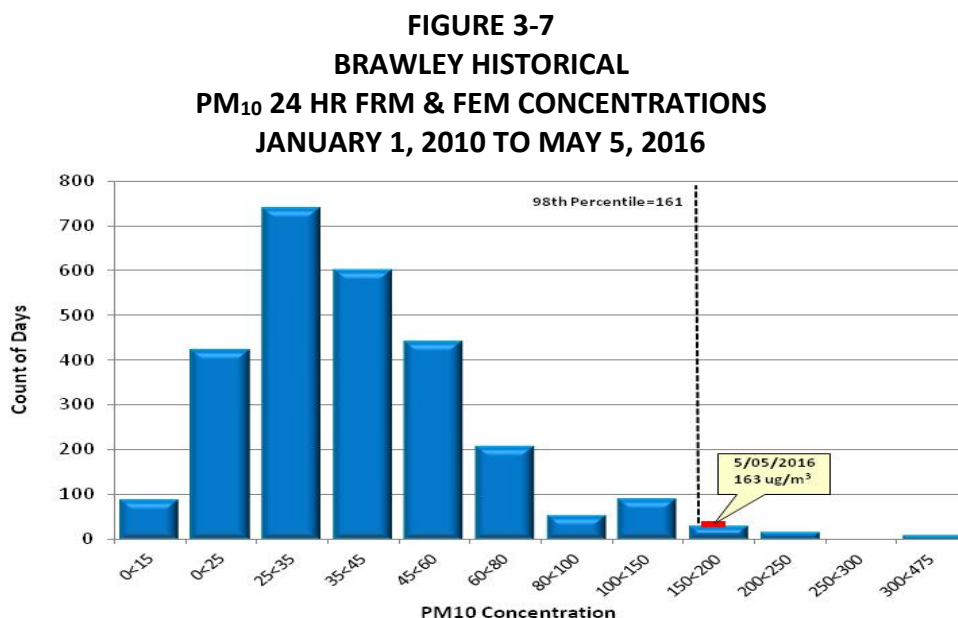


Fig 3-7: The 24-hr average PM₁₀ concentration at the Brawley monitoring site demonstrates that the concentration of 163 $\mu\text{g}/\text{m}^3$ falls above the 98th percentile.

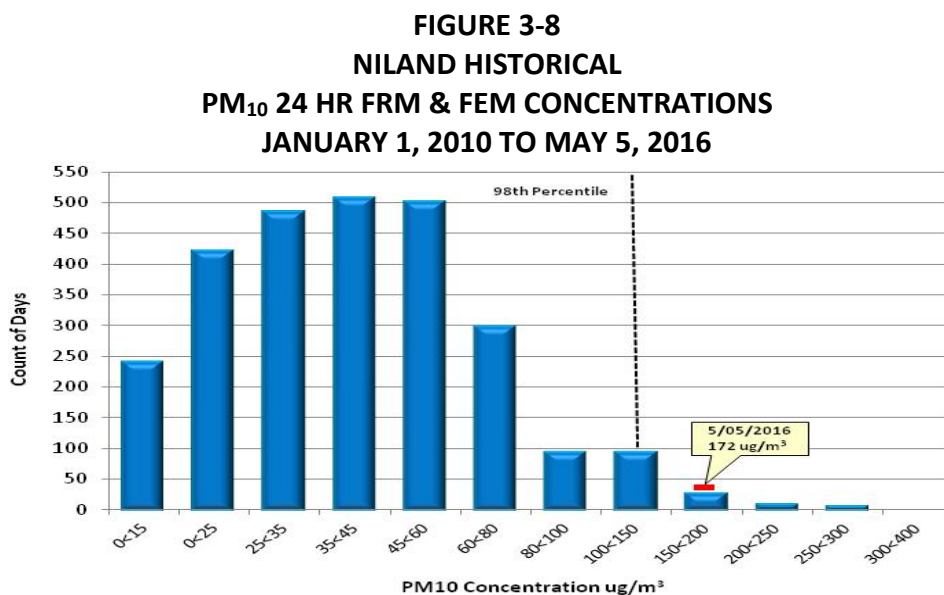


Fig 3-8: The 24-hr average PM₁₀ concentration at the Niland monitoring site demonstrates that the concentration of 172 $\mu\text{g}/\text{m}^3$ was in excess of the 98th percentile.

FIGURE 3-9
WESTMORLAND HISTORICAL
PM₁₀ 24 HR FRM & FEM CONCENTRATIONS
JANUARY 1, 2010 TO MAY 5, 2016

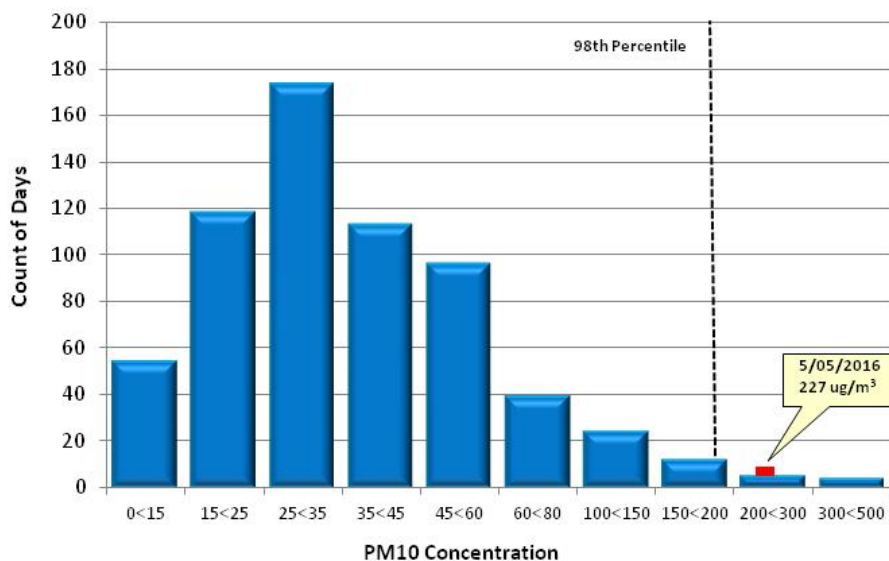


Fig 3-9: The 24-hr average PM₁₀ concentration at the Westmorland monitoring site demonstrates that the concentration of 227 µg/m³ was in excess of the 98th percentile.

For the combined FRM and FEM data sets, the annual historical and the seasonal historical PM₁₀ concentrations of 163 µg/m³ for Brawley, 172 µg/m³ for Niland, and 227 µg/m³ for Westmorland are all above the 98th percentile ranking. Looking at the annual time series concentrations, the seasonal time series concentrations, and the percentile rankings for both the historical and seasonal patterns, the May 5, 2016 measured exceedances are clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM₁₀ concentration observed on May 5, 2016 occurs infrequently. When comparing the measured PM₁₀ levels on May 5, 2016 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Brawley, Niland, and Westmorland monitoring sites were outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the May 5, 2016 natural event affected the concentrations levels at the Brawley, Niland, and Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on May 5, 2016 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the “not reasonably controllable or preventable” (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures to be enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for “high wind events” when PM₁₀ concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a “natural event” where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for May 5, 2016. In addition, this March 11, 2016 demonstration provides technical and non-technical evidence that strong and gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley and Westmorland monitors on May 5, 2016. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the May 5, 2016 EE.

IV.1 Background

Inhalable particulate matter (PM₁₀) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM₁₀ NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM₁₀ from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM₁₀. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

**FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT**

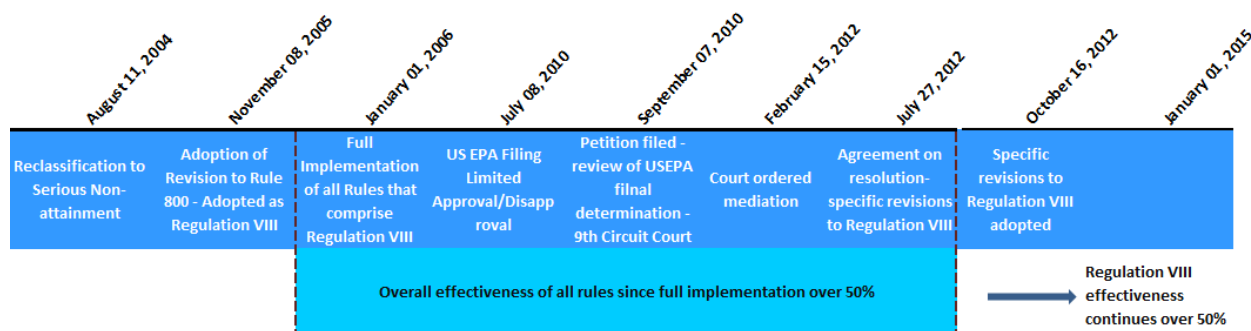


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

A brief summary of Regulation VIII, which is comprised of seven fugitive dust rules is found below. The **Appendix D** contains the complete set of rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM₁₀ from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM₁₀ events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On May 5, 2016 the ICAPCD declared a No Burn day (**Appendix A**). No complaints were filed for agricultural burning on May 5, 2016.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Westmorland, Niland, and Brawley during the May 5, 2016 PM₁₀ exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express,

May 5, 2016 Exceptional Event, Imperial County

and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM₁₀ emissions. May 5, 2016 was officially designated as a No Burn day.

FIGURE 4-2
PERMITTED SOURCES

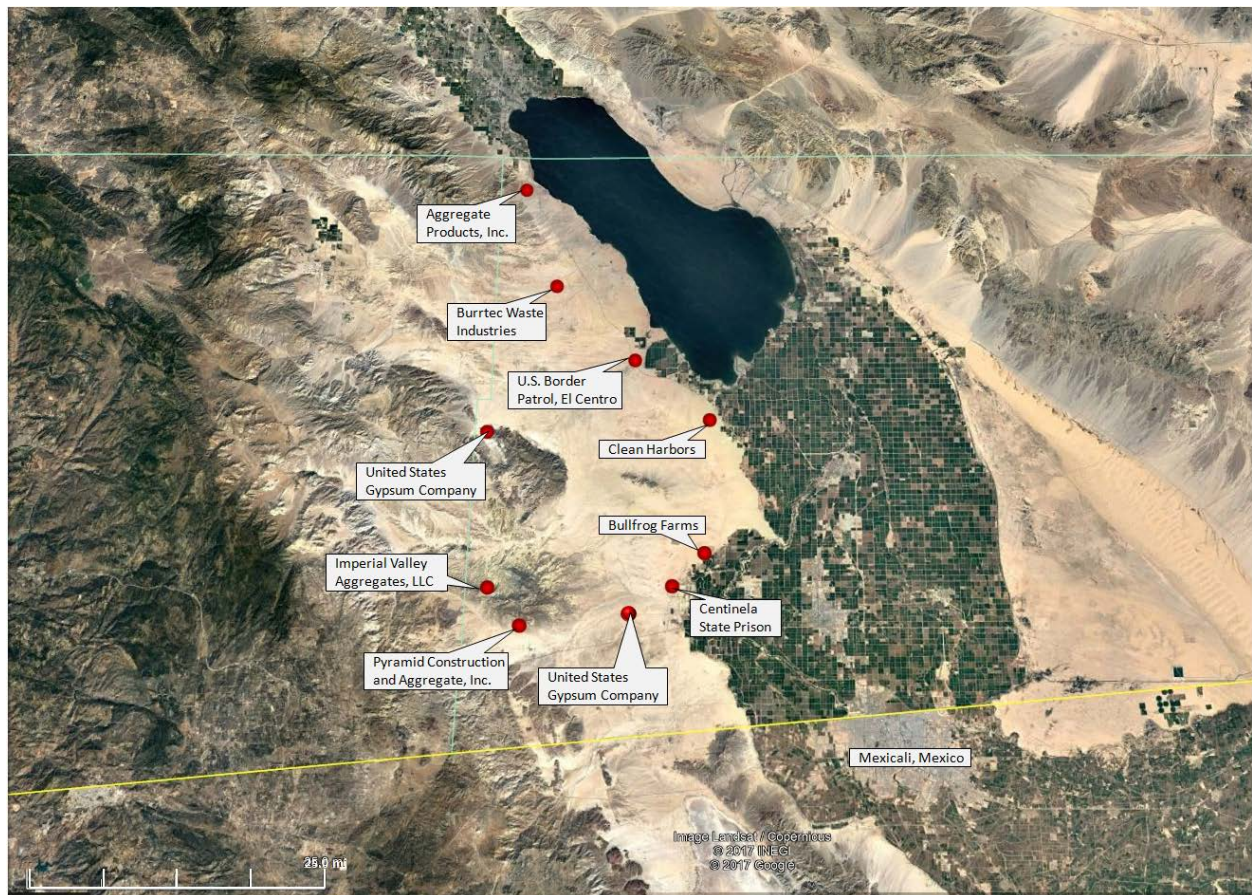


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Niland monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, the desert areas are managed either by the Bureau of Land Management or the California Department of Parks. Base map from Google Earth.

FIGURE 4-3
NON-PERMITTED SOURCES

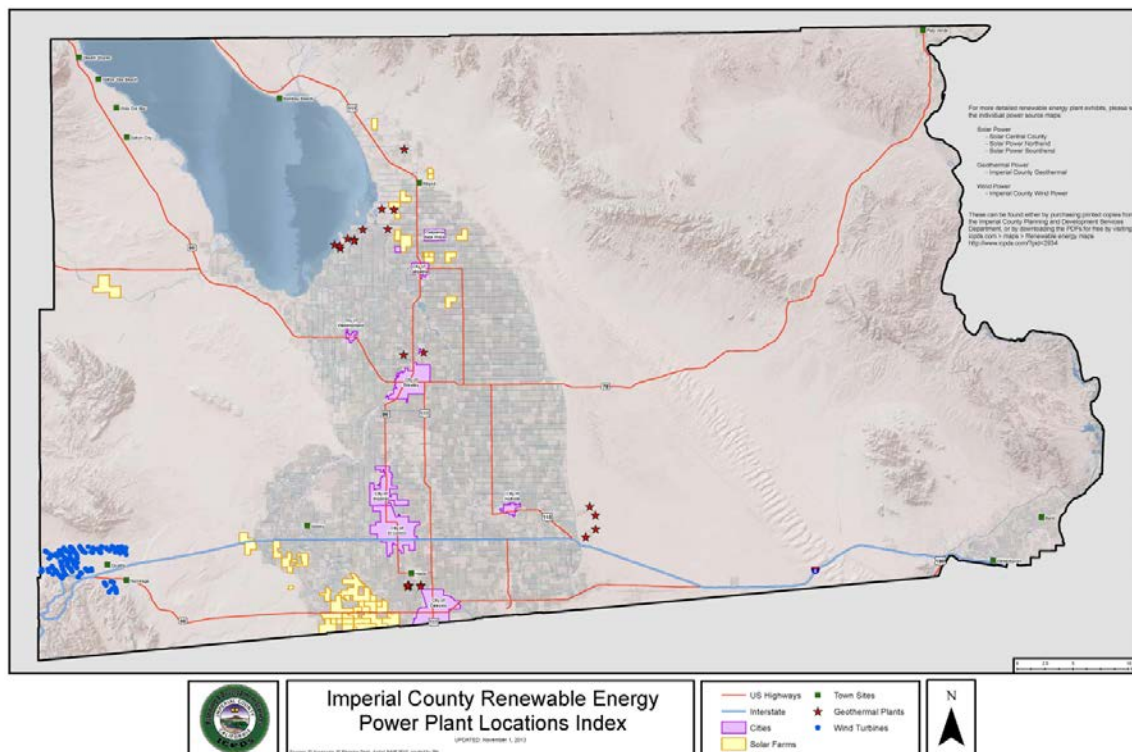


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants.

IV.2 Forecasts and Warnings

The NWS Phoenix office issued a combined weather story and forecast on May 4 that forecasted a dry cold front associated with a low pressure system moving into the area would generate strong winds by Thursday, May 5, 2016. Winds of 35 to 40 mph were expected. On May 4, 2016 the San Diego NWS office posted a combined weather story and forecast that the low pressure would create gusts up to 60 mph along mountain ridges and desert slopes. A Wind Advisory⁹ was issued on May 5, 2016 at 02:25 (effective 1600 to 2200) for Imperial County and neighboring areas in anticipation of the severity of the weather system. West winds of 25 to 30 mph with gusts to 40 mph were expected, along with reduced visibility due to blowing dust and sand. A Wind Advisory was also issued for portions of San Diego that included the desert slopes directly west of Imperial County. At 09:09 on May 5, 2016 a Blowing Dust Advisory¹⁰ was issued (effective

⁹ A wind advisory is issued when the following conditions are met for one (1) hour or longer: 1) sustained winds of 31 to 39 mph, and/or; 2) wind gusts of 46 to 57 mph for any duration. Source: NWS, 2016;
<http://www.weather.gov/lwx/WarningsDefined#WindAdvisory>

¹⁰ Blowing Dust Advisory is issued when blowing dust is expected to reduce visibility to between 1/4 and 1 mile, generally with winds of 25 mph or greater. <https://www.weather.gov/oun/spotter-wwa-definitions>

1600 to 2200) for Imperial County. Visibility was expected to fall below one mile due to blowing dust.

The ICAPCD posted on its website the combined weather stories and forecasts issued by the NWS Phoenix and San Diego offices regarding the high winds that were expected May 5, 2016. The notice also carried an advisory that high winds had the potential to suspend particulate matter into the air, and possibly pose an impact to public health.

IV.3 Wind Observations

Wind data during the event were collected from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County. Data were also collected from automated meteorological instruments that were upstream from the Brawley, Niland, and Westmorland station monitors during the wind event. El Centro NAF (KNJK) had 16 hours of winds at or above 25 mph. Imperial County Airport (KIPL) had three hours of winds above 25 mph. Wind speeds of 25 mph are normally sufficient to overcome most PM₁₀ control measures. Multiple upstream sites also reported winds of 25 mph or more. During the May 25, 2016 event wind speeds were above the 25 mph threshold, overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that high winds accompanying a strong cold front that moved through southern California lofted dust that caused uncontrollable PM₁₀ emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM₁₀, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements at or upstream of Brawley, Niland, and Westmorland monitoring stations during the event were high enough (at or above 25 mph, with wind gusts of 45 mph) that BACM PM₁₀ control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on May 5, 2016 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The May 5, 2016 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for the May 5, 2016 identified a Pacific storm system with associated gusty west winds that moved into the region. The system was described as a massive moving Pacific low pressure system located off the central and southern California coast. The associated strong low level front pushed through the region strengthening the pressure gradient at the surface creating gusty westerly winds that entrained windblown dust from natural areas, particularly from the desert and agricultural areas west of the Brawley, Niland and Westmorland monitors, overwhelming BACM controlled anthropogenic sources.

The instability of the Pacific system is confirmed when news articles such as the Times of San Diego reported strong gusty winds and rain in San Diego County. In addition, the NWS offices in San Diego and Phoenix both issued Wind Advisories that contained Blowing Dust Advisories for the mountain and desert slopes and Imperial County. Finally, the “[d]escriptive text narrative for smoke/dust observed in Satellite imagery through 0300Z May 6, 2016” described dense blowing dust across the interior of far southern California, far northern Baja, northwestern Mexico and western and north central Arizona, confirming the regional effect of the May 5, 2016 event

Figure 5-1 shows the packed surface pressure gradient over southeastern California and the resulting high winds (**Figures 5-2 and 5-3**).

FIGURE 5-1
SURFACE PRESSURE GRADIENT PACKED

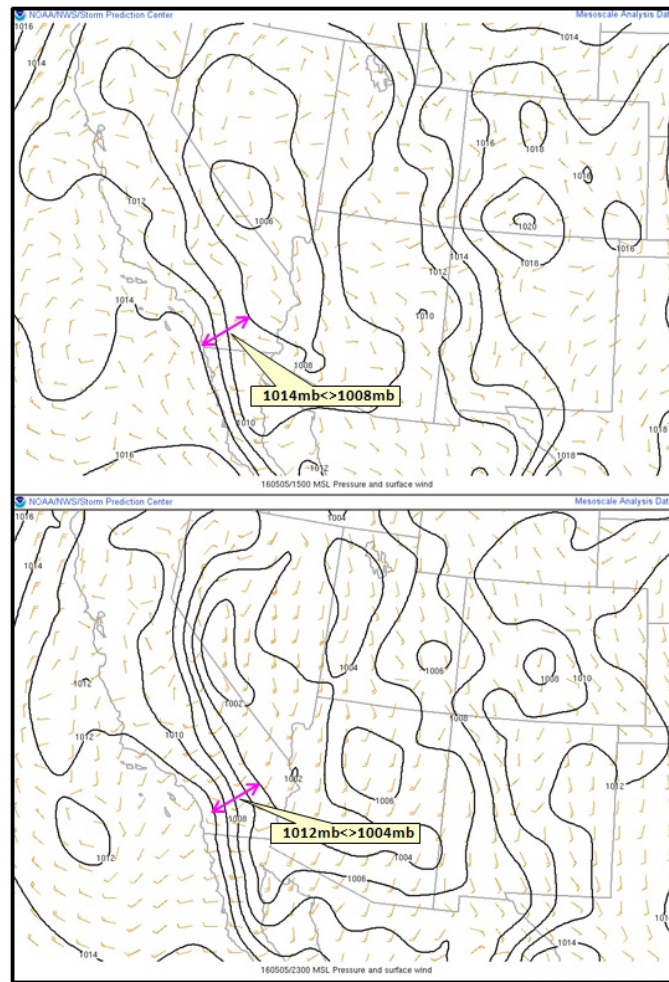


Fig 5-1: Two surface analysis images show the pressure gradient well packed over southeastern California. Top image is at 0700 and bottom image is 1500 PST May 5, 2016. Source: SPC Mesoscale Analysis archive; <http://www.spc.noaa.gov/exper/archive>

Figures 5-2 and 5-3 show surface wind speeds as measured at the El Centro NAF (KNJK) at 07:13 PST and at 15:16 PST on May 5, 2016. Wind barbs indicate westerly winds of at least 28.3 mph. These high winds (with higher gusts) that lasted for a longer portion of the day and were instrumental in entraining dust affecting air quality in Imperial County and causing an exceedance of the NAAQS.

FIGURE 5-2
HIGH WINDS IN IMPERIAL COUNTY

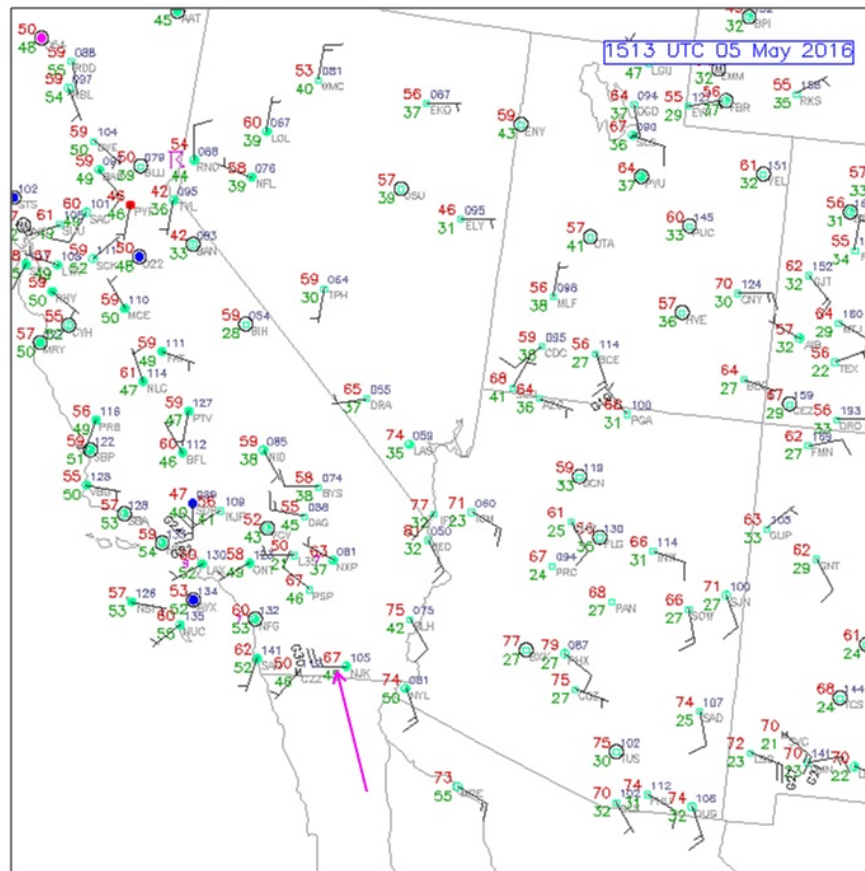


Fig 5-2: A surface wind map depicting high winds at KNJK at 07:13 on May 5, 2016. Winds at KNJK (see arrow) were at least 28.3 mph. Source: <http://weather.rap.ucar.edu/surface>

FIGURE 5-3
HIGH WINDS IN IMPERIAL COUNTY CONTINUE

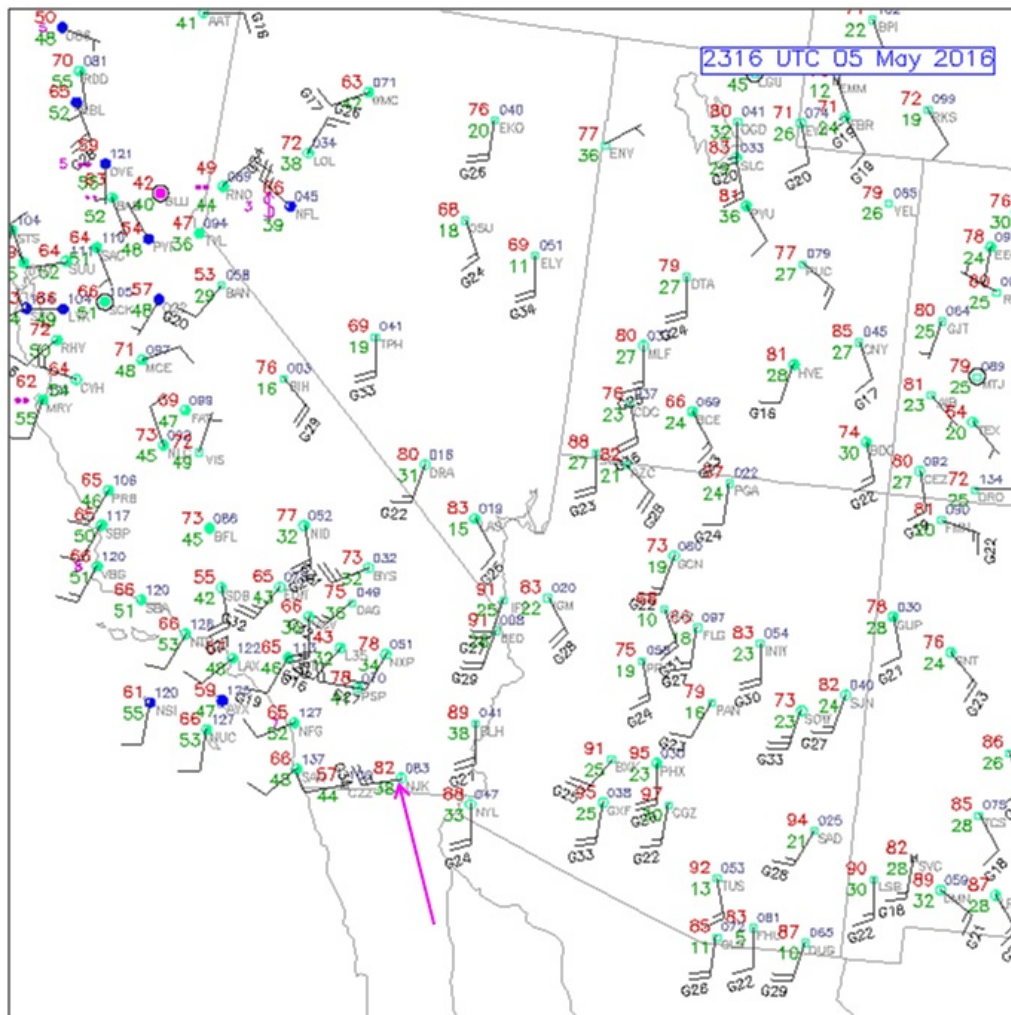


Fig 5-3: A surface wind map depicting high winds across southeast California at 15:16 LST ON May 5, 2016. Winds at KNJK (see arrow) were at least 28.3 mph. Source: <http://weather.rap.ucar.edu/surface>

Figures 5-4 and 5-5 shows the Aerosol Optical Depth over southeastern California on May 5, 2016 as captured by the MODIS¹¹ instrument onboard the Terra and Aqua satellites using the Deep Blue Aerosol Angstrom Exponent.¹² Green colors represent the dominance of larger particles

¹¹ MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm (Appendix A).

¹² **Aerosol Optical Depth (AOD) (or Aerosol Optical Thickness)** indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is "clean" - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise

(likely dust) while blue indicates finer particles. Unfortunately, both Terra and Aqua satellites made their pass before PM₁₀ concentrations were at their highest.

FIGURE 5-4
DEEP BLUE ANGSTRÖM EXPONENT – TERRA SATELLITE

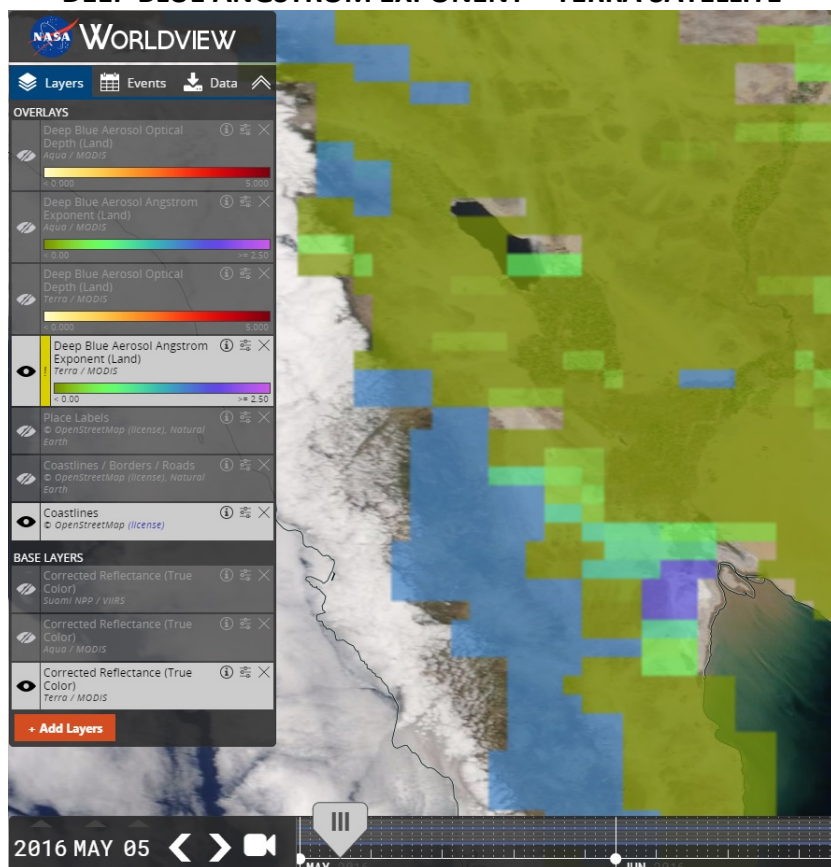


Fig 5-4: The MODIS instrument onboard the Terra satellite USING THE Deep Blue angstrom Exponent captured a large amount of dust-sized particles over southeastern California on May 5, 2016. Green colors represent the dominance of larger particles (likely dust) while blue indicates finer particles. Source: <https://worldview.earthdata.nasa.gov>

human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: <https://worldview.earthdata.nasa.gov> -The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke) <https://worldview.earthdata.nasa.gov>; The Ångström Exponent (denoted as AE or α) is a measure of how the AOD changes relative to the various wavelength of light (known as 'spectral dependence'.) This is related to the aerosol particle size. Roughly speaking, values less than 1 suggest an optical dominance of coarse particles (e.g. dust, ash, sea spray), while values greater than one 1 dominance of fine particles (e.g. smoke, industrial pollution); <https://deepblue.gsfc.nasa.gov/science>

FIGURE 5-5
AEROSOL OPTICAL DEPTH – AQUA SATELLITE

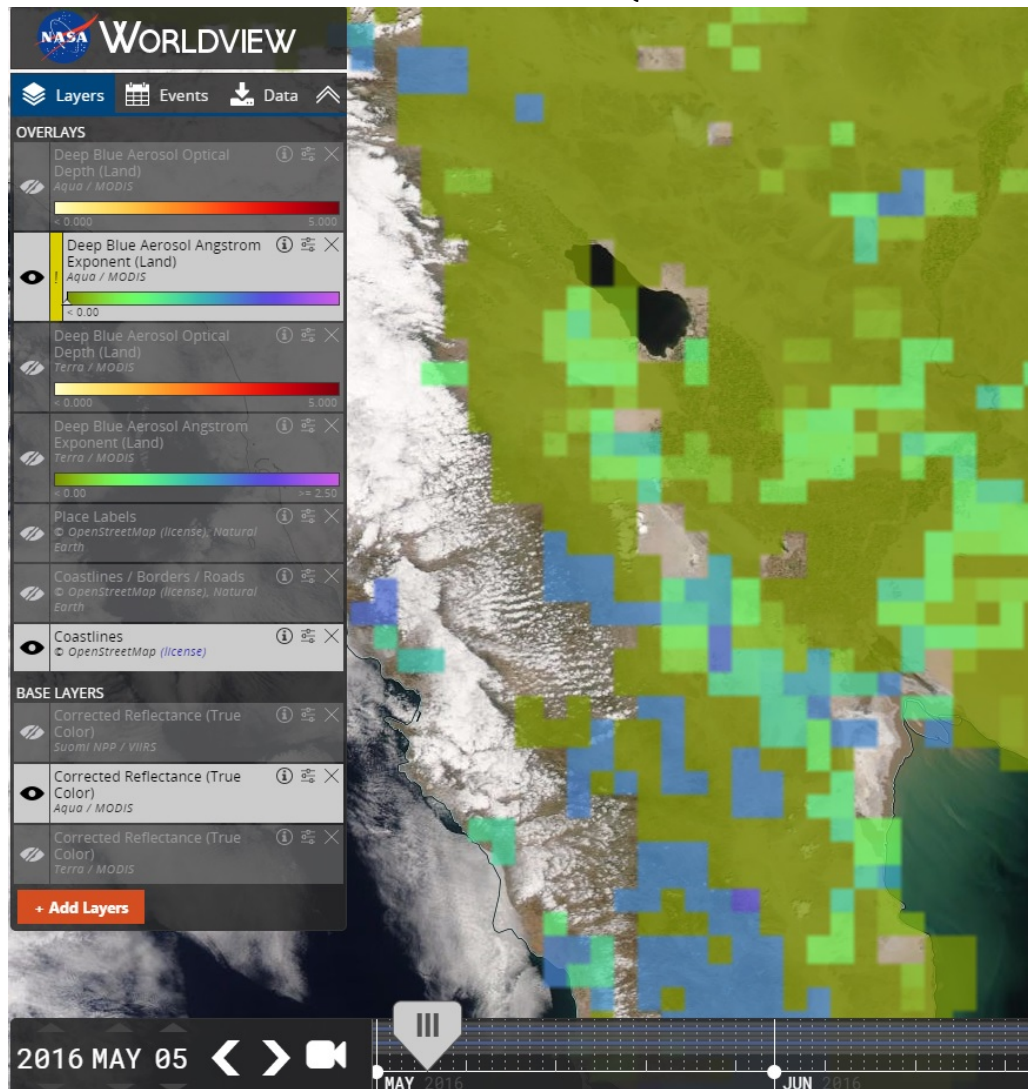


Fig 5-5: The MODIS instrument onboard the Aqua satellite captured a heavy AOD over southeastern California on May 5, 2016. Green colors represent the dominance of larger particles (likely dust) while blue indicates finer particles. Although both the Terra and Aqua satellite made their pass before concentrations were at a peak, this supports that a heavy layer of large-particle aerosols were present over Imperial County.

Source: <https://worldview.earthdata.nasa.gov>

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.¹³ **Tables 5-1 through 5-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM₁₀ concentrations at the exceeding stations.

¹³ "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-1
UPSTREAM WIND SPEEDS AND BRAWLEY PM₁₀ CONCENTRATIONS MAY 5, 2016

EL CENTRO NAF (KNJK)				IMPERIAL CO AIRPORT (KIPL)				MOUNTAIN SPRINGS GRADE (TNSC1)				SUNRISE-OCOTILLO (IMPSD)				BRAWLEY FEM	
HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	PM ₁₀ (µg/m ³)
56	23	280	28	53	13	300		050	36	205	53	0000	6	217	16	0000	31
156	20	270		153	13	280		150	38	205	54	0100	6	76	12	0100	31
256	11	270		253	7	260		250	33	213	52	0200	6	90	13	0200	26
356	18	270		353	11	260		350	30	206	49	0300	12	224	20	0300	26
456	28	260	36	453	15	270		450	11	225	40	0400	16	253	31	0400	34
541	29	260	39	544	23	270	34	550	19	217	36	0510	26	245	36	0500	107
656	28	270	34	653	22	270	29	650	25	207	39	0620	26	240	41	0600	101
754	33	260	39	753	23	270	34	750	25	210	42	0750	29	238	41	0700	118
801	31	260	43	809	22	270	30	850	22	217	43	0810	22	235	33	0800	356
956	25	290		953	15	290		950	25	219	38	0950	26	230	35	0900	64
1056	21	260		1053	18	290	24	1050	25	203	45	1040	20	233	31	1000	23
1156	25	260	30	1153	16	280	24	1150	28	213	41	1100	15	243	28	1100	48
1256	29	250	33	1202	13	280	24	1250	27	211	41	1250	16	264	29	1200	60
1356	30	260	41	1353	24	260	33	1350	28	228	40	1340	15	264	27	1300	158
1456	31	260	39	1453	26	270	36	1450	27	216	50	1400	19	266	31	1400	206
1556	26	270	38	1553	25	270	34	1550	29	222	46	1500	20	279	35	1500	482
1656	26	270	38	1653	25	280	33	1650	30	215	47	1600	19	280	34	1600	521
1756	24	280	36	1753	18	270	36	1750	21	221	47	1700	22	311	45	1700	405
1856	31	260	40	1853	23	270	39	1850	18	246	34	1800	17	267	28	1800	567
1956	25	270	31	1953	21	280	28	1950	20	247	31	1900	18	254	31	1900	111
2056	29	270		2053	22	280	34	2050	13	245	25	2000	17	254	32	2000	61
2156	32	250	39	2153	20	270	30	2150	25	230	37	2100	16	256	27	2100	63
2256	20	270		2253	14	280	25	2250	28	214	42	2200	18	252	29	2200	224
2356	22	280		2353	21	290	25	2350	29	203	45	2300	21	240	34	2300	89

*Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Sunrise Ocotillo (IMPSD) and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Brawley station does not record wind data. Wind speeds = mph; Direction = degrees.

TABLE 5-2
UPSTREAM WIND SPEEDS AND NILAND PM₁₀ CONCENTRATIONS MAY 5, 2016

EL CENTRO NAF (KNJK)				IMPERIAL CO AIRPORT (KIPL)				(FORMER) NAVAL TEST BASE				NILAND (ENGLISH RD)				NILAND (ENGLISH RD) FEM	
WIND	W/S	W/D	W/G	WIND	W/S	W/D	W/G	WIND	W/S	W/D	W/G	WIND	W/S	W/D	W/G	WIND	PM ₁₀ (µg/m ³)
56	23	280	28	53	13	300		0000	11	264		0000	5.5	147		0000	48
156	20	270		153	13	280		0100	17	252		0100	4.6	130		0100	44
256	11	270		253	7	260		0200	20	251		0200	8.1	116		0200	39
356	18	270		353	11	260		0300	22	244		0300	6.9	148		0300	35
456	28	260	36	453	15	270		0400	20	246		0400	6.7	170		0400	129
541	29	260	39	544	23	270	34	0500	22	245		0500	6.2	183		0500	234
656	28	270	34	653	22	270	29	0600	21	247		0600	11.2	248		0600	98
754	33	260	39	753	23	270	34	0700	22	249		0700	14.9	255		0700	107
801	31	260	43	809	22	270	30	0800	19	238		0800	11.9	268		0800	63
956	25	290		953	15	290		0900	10	236		0900	7.9	250		0900	77
1056	21	260		1053	18	290	24	1000		CALM		1000	4.6	260		1000	43
1156	25	260	30	1153	16	280	24	1100	10	32		1100	5.5	198		1100	74
1256	29	250	33	1202	13	280	24	1200	11	36		1200	5.9	216		1200	71
1356	30	260	41	1353	24	260	33	1300	3	316		1300	11.4	213		1300	142
1456	31	260	39	1453	26	270	36	1400	30	248		1400	14.3	240		1400	164
1556	26	270	38	1553	25	270	34	1500	33	235		1500	27.1	266		1500	820
1656	26	270	38	1653	25	280	33	1600	27	238		1600	29.5	265		1600	995
1756	24	280	36	1753	18	270	36	1700	27	237		1700	27.2	261		1700	386
1856	31	260	40	1853	23	270	39	1800	24	246		1800	24.4	254		1800	202
1956	25	270	31	1953	21	280	28	1900	22	240		1900	25.6	247		1900	100
2056	29	270		2053	22	280	34	2000	22	241		2000	26.7	251		2000	116
2156	32	250	39	2153	20	270	30	2100	21	243		2100	24.9	256		2100	86
2256	20	270		2253	14	280	25	2200	14	255		2200	23.3	251		2200	24
2356	22	280		2353	21	290	25	2300	19	249		2300	20.1	256		2300	23

*Wind data for KIPL and KNJK from the NCEI's QCLCD system. Niland station does not record wind gusts, nor does the former Naval Test Base. Wind data for Naval Test Base is from AQMIS2. Wind and air quality data for Niland from the EPA's AQS data bank. Wind speeds = mph; Direction = degrees

TABLE 5-3
UPSTREAM WIND SPEEDS AND WESTMORLAND PM₁₀ CONCENTRATIONS MAY 5, 2016

EL CENTRO NAF (KNJK)				IMPERIAL CO AIRPORT (KIPL)				FISH CREEK MTNS. (FHCC1)				WESTMORLAND				WESTMORLAND FEM	
HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	W/S	W/D	W/G	HOUR	PM ₁₀ (µg/m ³)
56	23	280	28	53	13	300		026	14	205	20	0000	0.9	185		0000	31
156	20	270		153	13	280		126	15	195	22	0100	1.8	229		0100	24
256	11	270		253	7	260		226	13	197	20	0200	3.2	257		0200	38
356	18	270		353	11	260		326	19	204	27	0300	2.7	273		0300	31
456	28	260	36	453	15	270		426	17	201	27	0400	6.1	251		0400	325
541	29	260	39	544	23	270	34	526	19	210	25	0500	5.4	244		0500	76
656	28	270	34	653	22	270	29	626	19	195	28	0600	5.2	257		0600	233
754	33	260	39	753	23	270	34	726	17	211	31	0700	6.1	251		0700	318
801	31	260	43	809	22	270	30	826	17	213	29	0800	7.4	245		0800	362
956	25	290		953	15	290		926	12	197	22	0900	5.2	250		0900	177
1056	21	260		1053	18	290	24	1026	8	217	16	1000	6.3	248		1000	40
1156	25	260	30	1153	16	280	24	1126	11	207	20	1100	7	242		1100	62
1256	29	250	33	1202	13	280	24	1226	14	195	24	1200	6.9	236		1200	59
1356	30	260	41	1353	24	260	33	1326	10	212	29	1300	9.1	226		1300	171
1456	31	260	39	1453	26	270	36	1426	21	246	32	1400	9.6	249		1400	557
1556	26	270	38	1553	25	270	34	1526	26	262	40	1500	8.6	253		1500	370
1656	26	270	38	1653	25	280	33	1626	16	263	41	1600	10.9	260		1600	468
1756	24	280	36	1753	18	270	36	1726	22	255	37	1700	13.4	272		1700	446
1856	31	260	40	1853	23	270	39	1826	23	253	44	1800	8.9	260		1800	449
1956	25	270	31	1953	21	280	28	1926	16	264	47	1900	6.1	250		1900	68
2056	29	270		2053	22	280	34	2026	27	255	44	2000	4.3	256		2000	90
2156	32	250	39	2153	20	270	30	2126	21	221	42	2100	7.3	251		2100	213
2256	20	270		2253	14	280	25	2226	14	266	45	2200	7.7	266		2200	543
2356	22	280		2353	21	290	25	2326	7	277	25	2300	6.1	272		2300	318

*Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Fish Creek Mountains (FHCC1) from the University of Utah's MesoWest system. Wind and air quality data for Westmorland from the EPA's AQS data bank. Westmorland station does not record wind data. Wind speeds = mph; Direction = degree

Figure 5-6 is a graphic depiction that combines the HYSPLIT trajectory, upstream wind speeds, and important peak concentration times at the Brawley, Niland and Westmorland monitors. As early as May 4, 2016 the San Diego NWS office issued an Urgent Weather message advising of strong gusty winds through Friday May 6, 2016 for the mountain and desert areas. Therefore, it was no surprise that by the early morning hours of May 5, 2016 strong westerly winds, measured at or above 25mph at KIPL and KNJK, blew across the mountains of San Diego County down the desert slopes at places like Mountain Springs Grade and into Imperial County.

Elevated blowing dust observed at KNJK over a period of several hours correlated with the elevated PM₁₀ concentrations at Brawley, Niland, and Westmorland. In addition, concentrations at the Brawley, Niland and Westmorland monitors increased briefly during the early morning hours dipping temporarily only to rise significantly and continuously during the afternoon to

evening hours. While all the air monitors in Imperial County measured elevated concentrations, only the northern monitors measured an exceedance, otherwise known as a “northern” event.

FIGURE 5-6
EXCEEDANCE FACTORS MAY 5, 2016

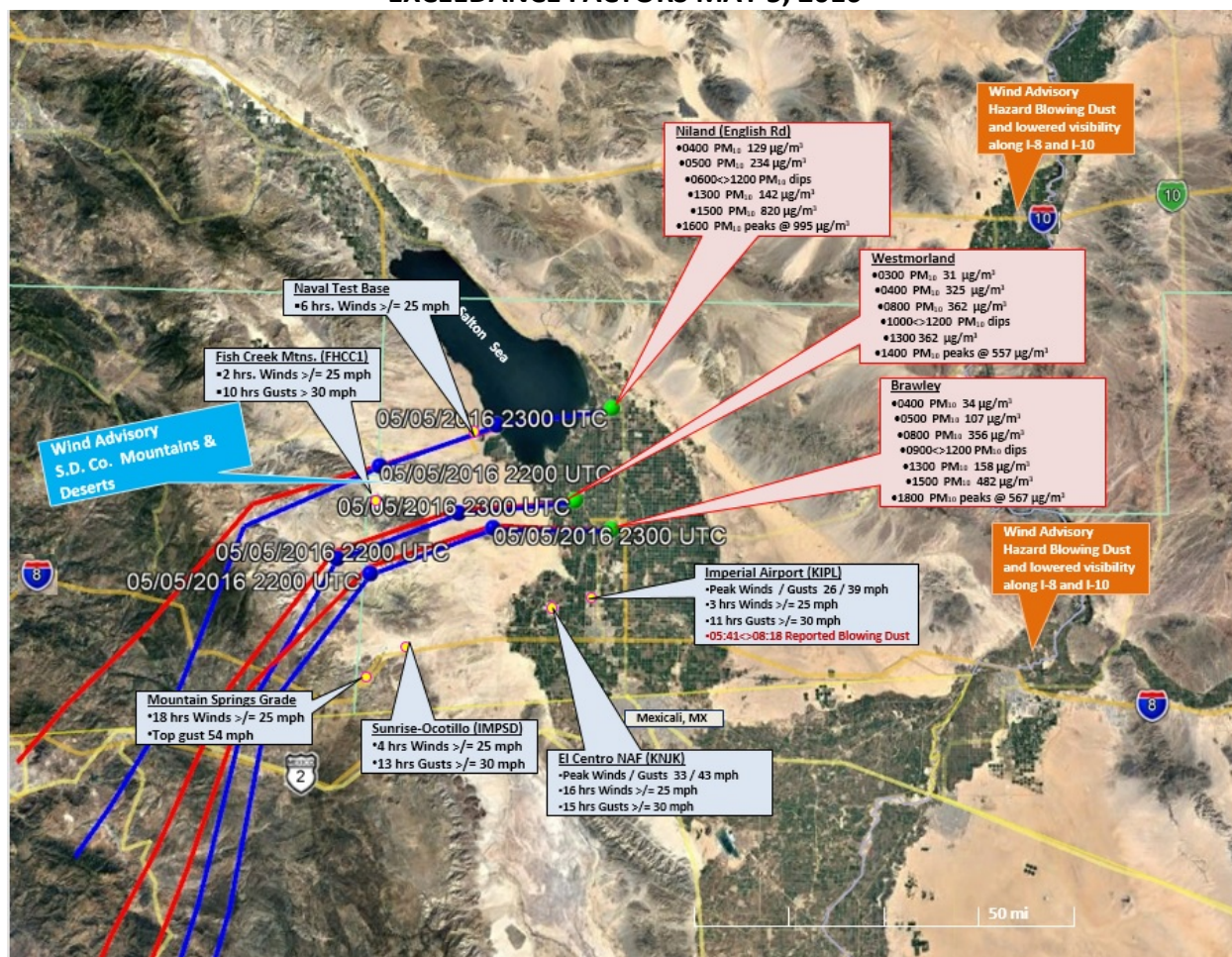


Fig 5-6: Winds entrained dust from the western edge of the Sonoran Desert into Imperial County. The 6-hour HYSPLIT back-trajectory depicts the general airflow ending at Brawley, Niland, and Westmorland at 1600 PST. This was in the middle of the “window” when the three sites reached peak hourly concentrations between 1400 and 1800 PST. Red trajectories indicate airflow at 10m; blue is airflow at 100m. Times given are for the blue trajectory. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA’s Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figure 5-7 through 5-9 depict PM₁₀ concentrations and wind speeds over a 72-hour period at Brawley, Niland, and Westmorland. Fluctuations in hourly concentrations at all sites over 72 hours show a positive correlation with wind speeds, particularly with gusts, measured at the Imperial County Airport (KIPL) and the El Centro NAF (KNJ).

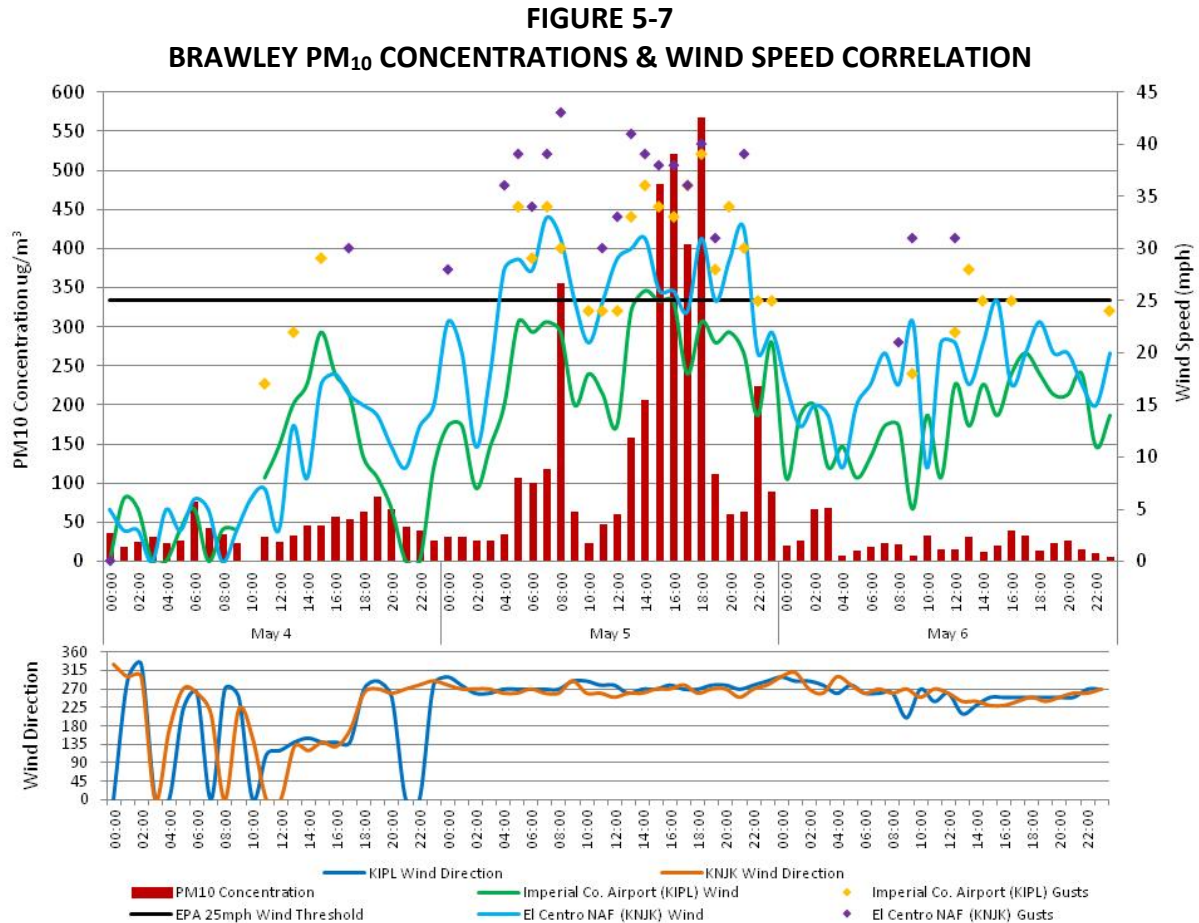


Fig 5-7: Fluctuations in hourly concentrations over 72 hours show a positive correlation with wind speeds, and particularly gusts, at Imperial County Airport (KIPL) and El Centro NAF (KNJKL). Wind speeds increased as the wind shifted more westerly around mid-morning. Brawley station does not measure wind. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

FIGURE 5-8
NILAND PM₁₀ CONCENTRATIONS & WIND SPEED CORRELATION

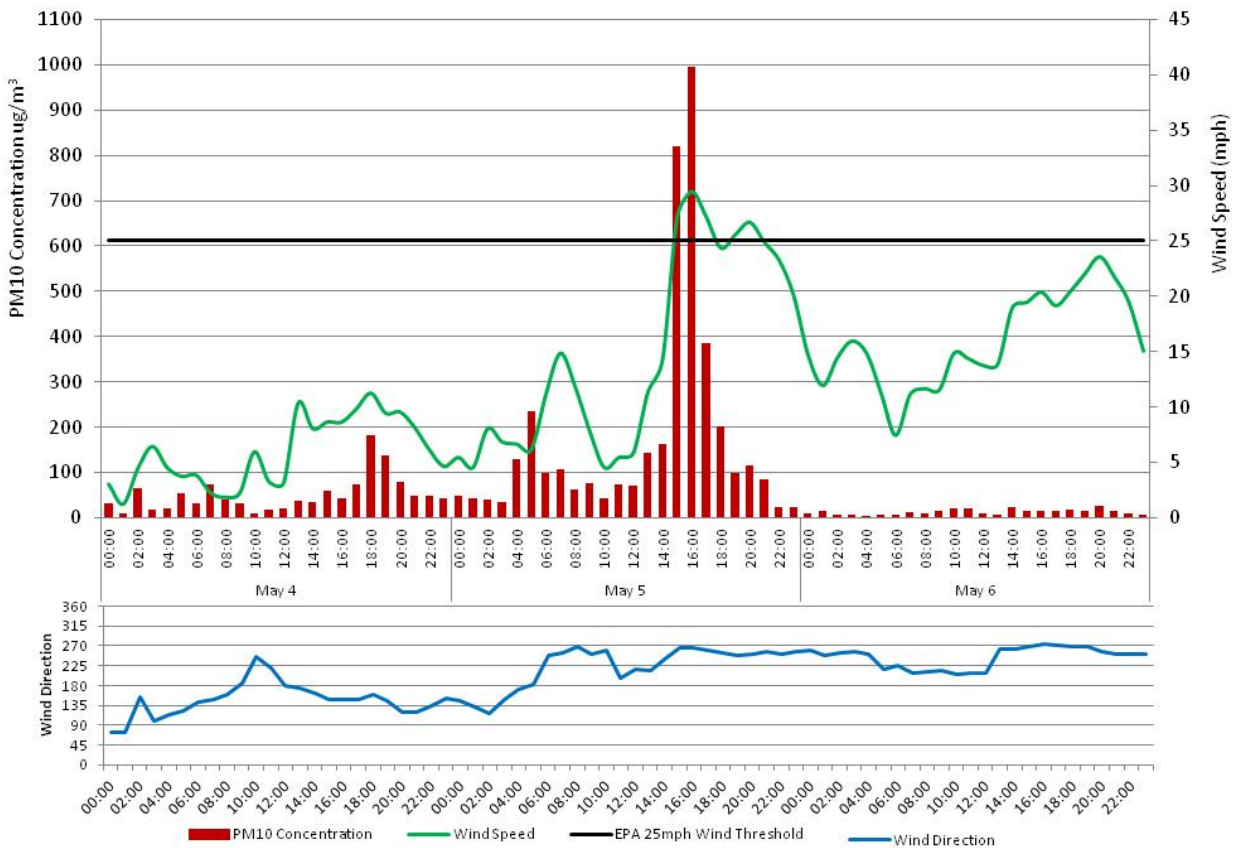


Fig 5-8: Niland (English Rd) experienced winds over the 25 mph threshold. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank.

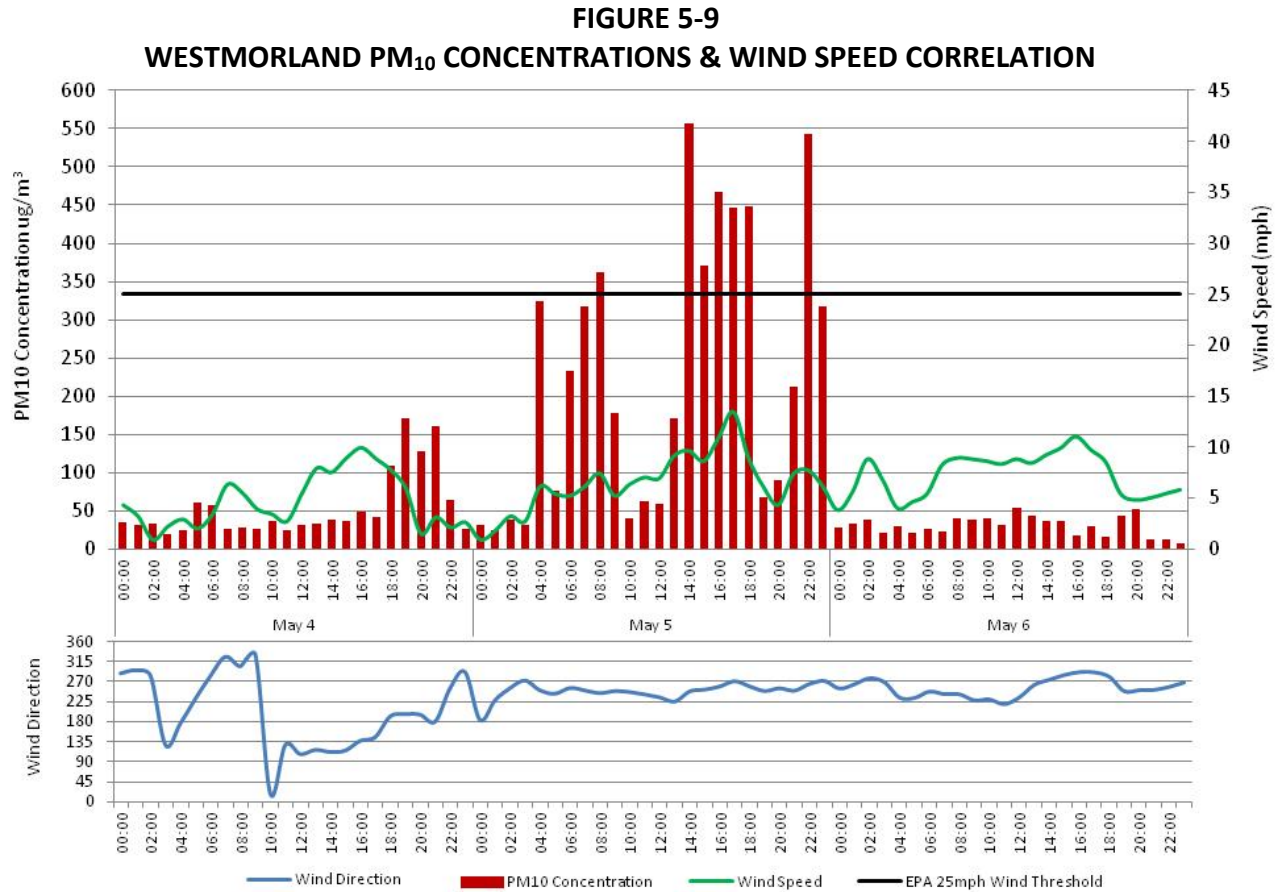


Fig 5-9: The lesser wind speeds at Westmorland allowed for greater deposition of dust on the monitor, and as a result it had a higher 24-hour average than the Brawley monitor. The station was also more westerly than Brawley or Niland, which placed it in the brunt of the dust-laden winds. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank.

Figure 5-10 provides a comparative look at PM₁₀ concentrations at Brawley, Niland, and Westmorland along with wind speeds at upstream sites over a 72-hour period. Increases in hourly concentrations at the monitoring stations occur subsequent to an increase in winds measured at upstream sites.

FIGURE 5-10
BRAWLEY, NILAND & WESTMORLAND
PM₁₀ CONCENTRATIONS & UPSTREAM WIND SPEEDS

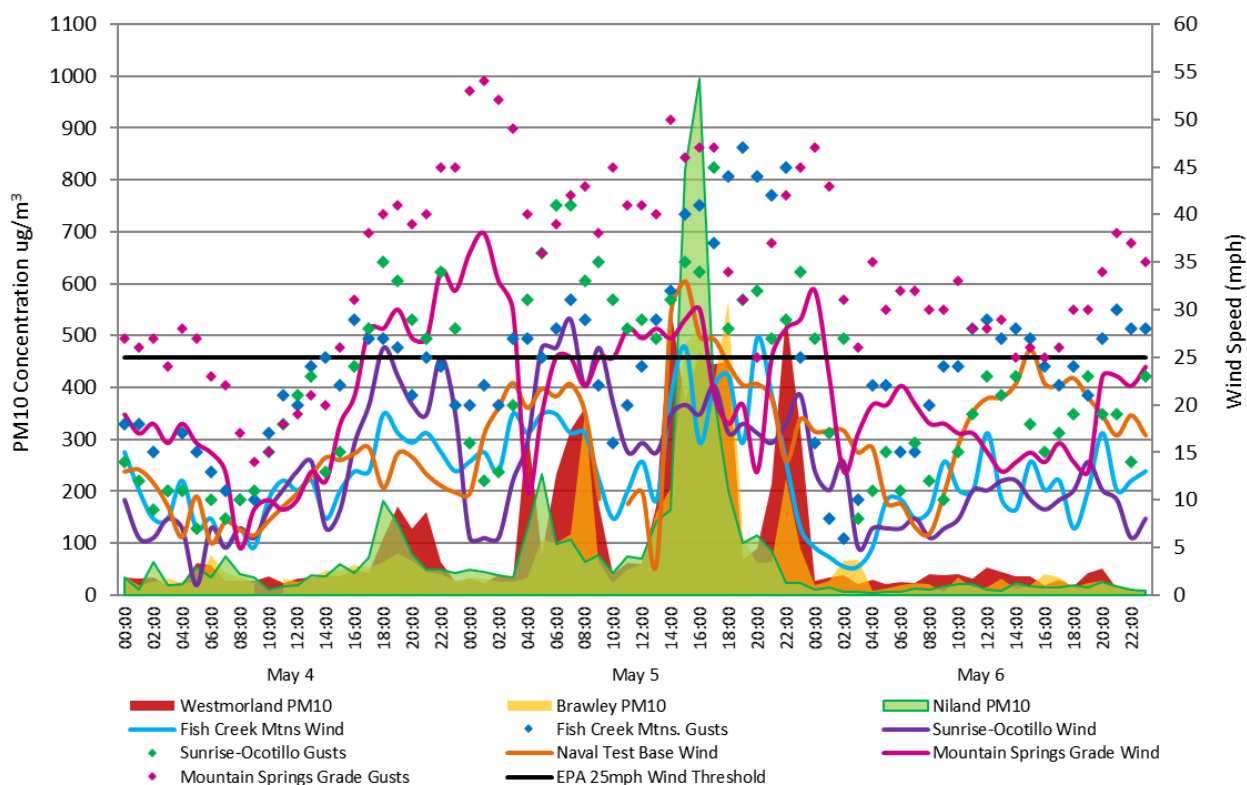


Fig 5-10: An increase in winds and particularly gusts at upstream sites led to an increase in PM₁₀ concentrations as the dust laden winds made their way downstream. Air quality data from the EPA's AQS data bank. Wind data from the University of Utah's MesoWest

Figure 5-11 compares the 72-hour concentrations at Calexico, El Centro, Brawley, Westmorland, and Niland over a 72-hour period between May 4, 2016 and May 6, 2016. Visibility¹⁴ at Imperial County Airport (KIPL) and El Centro NAF (KNJK) dipped significantly just prior to significantly increased concentrations at the monitoring stations downstream. This supports that the suspended particulate matter lofted upstream of the airfields was moving downwind and affected air quality downstream.

¹⁴ According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; <http://www.nws.noaa.gov/asos/vsby.htm>.

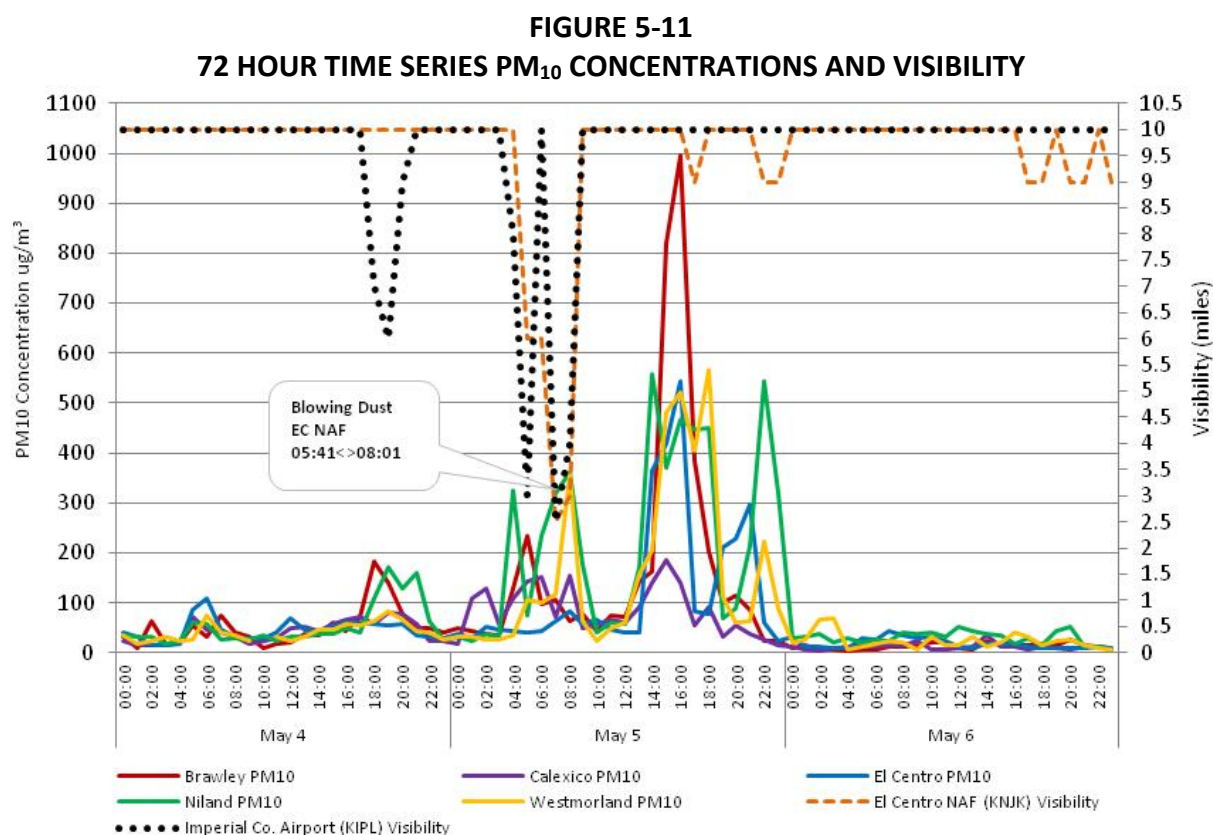


Fig 5-11: Visibility as reported from El Centro NAF (KNJK) and Imperial County Airport (KIPL) shows that visibility dipped significantly at KIPL and KNJK prior to elevated concentrations at Brawley, Westmorland, and Niland. As the dust was washed downstream, it later caused peak hourly concentrations at the monitoring stations. Visibility data from the NCEI's QCLCD data bank

The NWS Phoenix offices issued a Blowing Dust Advisory at 2:58 p.m. on May 5, 2016 for Imperial County and particularly the western portions of the county. West winds of 25 to 30 mph with gusts of 40 mph were expected, with even higher gusts near the Imperial County-San Diego County border. The advisory warned that visibility potentially could drop to one mile. The entrained windblown dust affected air quality in Imperial County. **Figures 5-12 through 5-14** show the Air Quality Index¹⁵ for Brawley, Niland, and Westmorland on May 5, 2016. Brawley's air quality remained in the "Green" or Good level (PM₁₀ 0-50 µg/m³) until entering the "Yellow" or Moderate level (PM₁₀ 51-100 µg/m³) at 10 a.m. At 12 a.m. air quality dropped even further to the "Orange" or Unhealthy for Sensitive Groups (PM₁₀ 101-150 µg/m³). Niland and

¹⁵ The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: <https://airnow.gov/index.cfm?action=aqibasics.aqi>.

Westmorland's air quality was Green until entering the Yellow level at 6 a.m. It remained there until dropping into the Orange level at 6 p.m. These AQI's shows that the entrained windblown dust transported by strong westerly winds affected the air quality in Imperial County

FIGURE 5-12
IMPERIAL VALLEY AIR QUALITY INDEX IN BRAWLEY
May 5, 2016

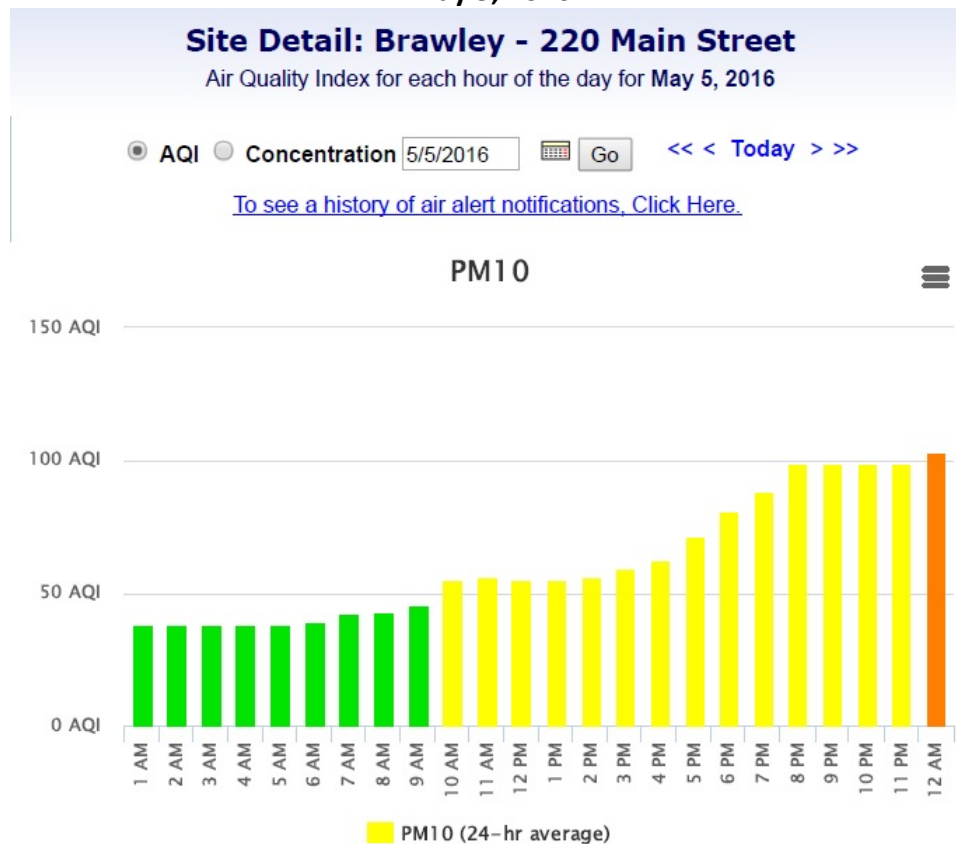


Fig. 5-12: The reduced air quality in Brawley shows that the fugitive dust lofted by high winds affected the air quality of the Imperial Valley. Source: ICAPCD archives.

FIGURE 5-13
IMPERIAL VALLEY AIR QUALITY INDEX IN NILAND
May 5, 2016
PM10

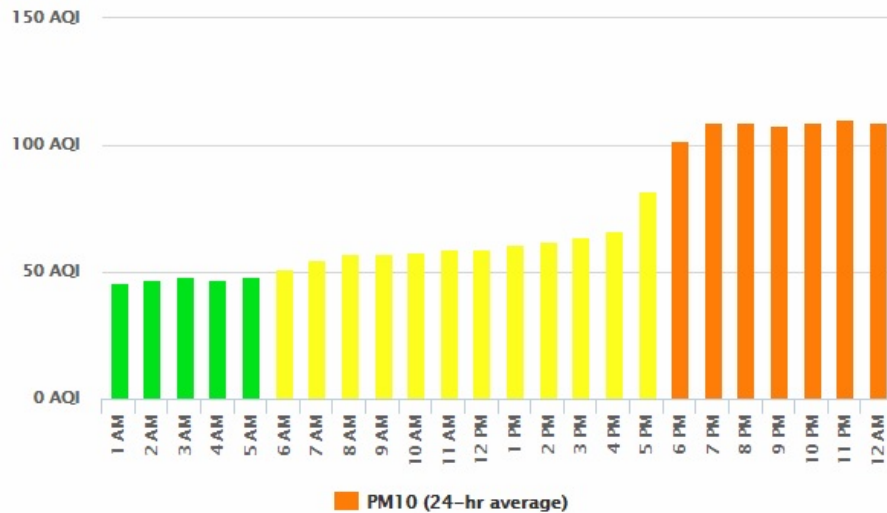


Fig. 5-13: The reduced air quality in Niland shows that the fugitive dust lofted by high winds affected the air quality of the Imperial Valley. Source: ICAPCD archives.

FIGURE 5-14
IMPERIAL VALLEY AIR QUALITY INDEX IN WESTMORLAND
May 5, 2016
PM10

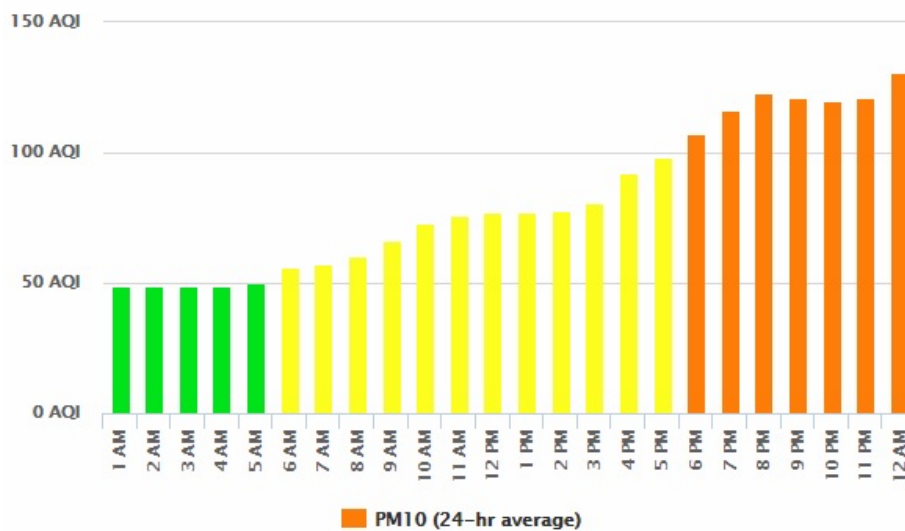


Fig. 5-14: The reduced air quality in Westmorland shows that the fugitive dust lofted by high winds affected the air quality of the Imperial Valley. Source: ICAPCD archives.

V.2 Summary

The preceding discussion, graphs, figures and tables provide wind direction, wind speed and PM₁₀ concentration data illustrating the spatial and temporal representation of the gusty west winds that were associated with the passage a powerful Pacific low pressure system that passed through the region. The information provides a clear causal relationship between the entrained windblown dust and the PM₁₀ exceedance measured at the Brawley and Westmorland monitors on May 5, 2016. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM₁₀ were carried aloft by strong westerly winds into the lower atmosphere causing a change in the air quality conditions within Imperial County. The entrained dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM₁₀ concentrations measured on May 5, 2016 coincided with high wind speeds and that gusty west winds were experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-15
MAY 5, 2016 WIND EVENT TAKE AWAY POINTS

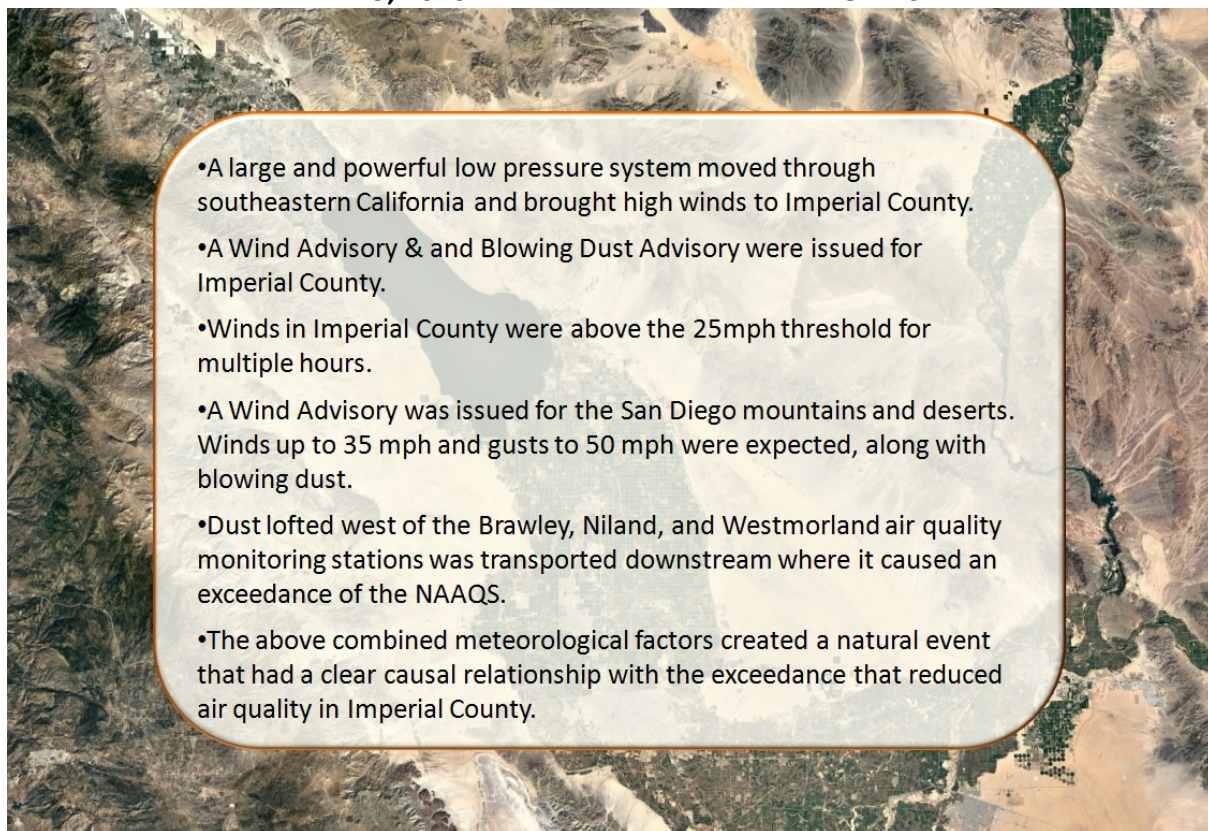


Fig 5-15: Illustrates the factors that qualify the May 5, 2016 natural event which affected air quality as an Exceptional Event.

VI Conclusions

The PM₁₀ exceedance that occurred on May 5, 2016, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST		
EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM ₁₀)		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-29; 65
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	46-63; 64
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	30-38; 65
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	39-45; 64
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	46-63; 64

VI.1 Affects Air Quality

The preamble to the revised EER states that an event is considered to have affected air quality if it can be demonstrated that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the May 5, 2016 event which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

In order for an event to be defined as an exceptional event under section 50.1(j) of 40 CFR Part 50 an event must be “not reasonably controllable or preventable.” The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. The nRCP is met for natural events where high wind events entrain dust from desert areas, whose sources are controlled by BACM, where human activity played little or no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial

County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM₁₀ exceedance measured at the Brawley, Niland, and Westmorland monitors were caused by naturally occurring strong gusty west winds that transported fugitive dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west and southwest of Imperial County. These facts provide strong evidence that the PM₁₀ exceedances at Brawley, Niland, and Westmorland on May 5, 2016, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a “Natural Event” (50.1(k) of 40 CFR Part 50) is an event and its resulting emissions, which may recur at the same location where anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions, thus meeting the criteria that human activity played little or no direct causal role. As discussed within this demonstration, the PM₁₀ exceedances that occurred at Brawley, Niland, and Westmorland on May 5, 2016, were caused by the transport of fugitive dust into Imperial County by strong westerly winds associated with the passage of low pressure system and accompanying cold front that moved through the region. At the time of the event anthropogenic sources were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM₁₀ concentrations at Brawley, Niland, and Westmorland during different days, and the comparative analysis of different areas in Imperial and Riverside county monitors demonstrates a consistency of elevated gusty west winds and concentrations of PM₁₀ at the Brawley, Niland, and Westmorland monitoring stations on May 5, 2016 (Section V). In addition, these time series plots and graphs demonstrate that the high PM₁₀ concentrations and the gusty west winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty west winds. Days immediately before and after the high wind event PM₁₀ concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the entrained fugitive emissions to the exceedances on May 5, 2016.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM₁₀ values measured at the Brawley, Niland, and Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains wind advisories issued by the National Weather Service and Imperial County on or around May 5, 2016. In addition, this Appendix contains the air quality alert issued by

Imperial County advising sensitive receptors of potentially unhealthy conditions in Imperial County resulting from the strong gusty winds. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM₁₀ concentrations in Imperial County.

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM₁₀ Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM₁₀ Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.